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IMPERIAL YEOMANRY HOSPITALS

Report of the Imperial Yeomanry Hospitals Committee

VOL. III.

PRESENTATION OF MEDALS BY HER MAJESTY THE QUEEN.

(Photo by A. Bassano.)

THE IMPERIAL YEOMANRY HOSPITALS

In South Africa

1900—1902

EDITED BY

THE COUNTESS HOWE

VOL. III.

LONDON
ARTHUR L. HUMPHREYS, 187 PICCADILLY
1902

MEDICAL AND SURGICAL REPORTS

ARRANGED FOR THE COMMITTEE

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MEDICAL AND SURGICAL REPORTS

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IMPERIAL YEOMANRY HOSPITAL, DEELFONTEIN.

NOTES ON THE WORK OF THE MEDICAL DIVISION

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INTRODUCTORY.*

OWING to lack of statistical material, the compilation of the following Notes has been a matter of some difficulty.

When the hospital was handed over to the military authorities, in April 1901, it was deemed advisable to hand over at the same time the official records of the work done in the hospital during the time it was under the charge of the Yeomanry Medical Staff. The hospital books are therefore not available for the purposes of an exhaustive Report. Fortunately the greater number of the case papers were brought home when the hospital changed hands, and these have been largely utilised for the purpose. No case has been cited below without reference to, and in many cases transcript from, the notes taken at the time of the patient's residence at Deelfontein, and in every instance in which figures have been quoted a reference to case-records or other official documents can be given. For the rest, the various statements made obviously partake more of the nature of reminiscence than of report. A constant endeavour to avoid mis-statement

* Owing to his lamented illness and death, the late Dr. Washbourn did not revise this report.

has been made, but it may be that the obliterating influence of time and distance may have led to minor inaccuracies.

The Hospital Staff arrived at Deelfontein on the 5th of March, 1900, and the remnant left for home on the 2nd of April, 1901. During the twelve months the hospital was in active work, 5888 cases were admitted as in-patients, and of these 4731 passed through the Medical Wards.

The work of the Medical Division may be considered under the following headings:—

Enteric Fever.
Dysentery.
Scarlet Fever.
Measles.
Influenza.
Mumps.
Malaria.
Malta Fever.
Simple Continued Fever.
Diseases of the Alimentary System.
Diseases of the Respiratory System.
Diseases of the Circulatory System.
Diseases of the Nervous System.
Diseases of the Urinary System.
Diseases of the Skin.
Rheumatism.
General Debility.

Enteric Fever.*

A large number of cases of typhoid fever admitted into the Imperial Yeomanry Hospital at Deelfontein during the year, from March, 1900, to March, 1901, were convalescent on arrival, and the notes of others have been lost. We have, however, collected 262 cases, all of which were in the acute stage when in the hospital, and of which detailed notes are available. We have analysed these cases and have compared them with the following:—1. A series of cases which were admitted to the emergency hospital during the epidemic of enteric fever at Maidstone in the year 1897. These cases, 210 in all, have been carefully analysed by Dr. T. B. Poole.† 2. Statistics of cases analysed by Dr. F. F. Caiger and Dr. E. W. Goodall.‡ 3. An analysis by Dr. W. Osler§ of 829 cases treated in the Johns Hopkins Hospital during the years 1889 to 1899. 4. Statistics of 506 cases at the Eastern Fever Hospital during the years 1892–1894.‖ 5. Other accounts of typhoid fever during the campaign by Dr. H. H. Tooth, Dr. H. D. Rolleston, and Dr. F. D. Boyd. Our chief object has been to point out the main features of the enteric fever occurring in South Africa, and

* This paper on Enteric Fever was read before the Medical Society of London, on Oct. 28th, 1901.
† *Guy's Hospital Reports*, Vol. LIII.
‡ *Metropolitan Asylums Board Reports*, 1896.
§ *Johns Hopkins Hospital Reports*, Vol. VIII., Nos. 5 to 9, 1900.
‖ Quoted in Goodall and Washbourn's *Manual of Infectious Diseases*.

to ascertain whether it differs from that met with in England and America. At the same time we have considered the influence of inoculation upon the course and the incidence of the disease, and have given a brief account of a few cases of special interest.

Mortality.—There were 36 deaths in our 262 cases, or a mortality of 13·7 per cent. At the Metropolitan Asylums Board Hospitals, in 15,632 cases during the years from 1871 to 1900, the mortality was 18·44 per cent., while in 1900 the mortality was 14·09 per cent. In the Worthing epidemic in 1894 there were 2257 cases, with a mortality of 13 per cent. During the Maidstone epidemic 1847 cases were notified, with a mortality of 7·14 per cent. Dr. Osler in his text-book gives a mortality of 11·2 per cent. at the Montreal Hospital for twenty years, and at the Johns Hopkins Hospital a mortality of 7·5 per cent. in the 829 cases analysed. At the Edinburgh and East of Scotland Hospital, in South Africa, the mortality was 10·7 per cent. In considering mortality, the age and condition of the patient must be borne in mind. Most of our patients were young adults, in whom the disease is less severe than in older people, but more severe than in children, and many of them had suffered from considerable fatigue and privation, not only before but even after they had been attacked. Our mortality (13·7 per cent) is practically the same as that of the Metropolitan Asylums Board Hospitals during 1900, and as that of the Worthing epidemic; it is almost double that of the Maidstone epidemic and the Johns Hopkins cases.

Relapses.—61 of our 262 patients suffered from relapse; but in 36 of these relapse arose either immediately or shortly after admission, the primary attack having occurred elsewhere. Subtracting these cases, there remain 25 out of 226 patients who relapsed in the hospital, an incidence of 11 per cent. Dr. Osler, in 829 cases at the Johns Hopkins Hospital, gives an incidence of 10 per cent.; Dr. Goodall and Dr. J. W. Washbourn, in 506 cases at the Eastern Fever Hospital, an incidence of 13 per cent; Dr. Caiger and Dr. Goodall, in 611 cases, an incidence of 11·9 per cent. Dr. Rolleston,* in an analysis of 244 cases at the Imperial Yeomanry Hospital at Pretoria, gives an incidence of 21 per cent. He, however, informs us that there are included among his cases a certain number of patients who had suffered from the primary attack elsewhere; which, we think, will account for the high incidence. At the Edinburgh and East of Scotland Hospital in South Africa, in 150 cases the incidence was only 5·3 per cent. Possibly this low rate may be due to the early transfer of cases to other hospitals. It will thus be seen that our incidence of relapse corresponds with the average in England and America. We have no doubt that the too early removal of patients predisposes to relapse. 36 of our cases relapsed either immediately or shortly after

* *Vide Brit. Med. Journ.* 1901, Vol. II. p. 974; also Medical Report of Imperial Yeomanry Hospital, Pretoria, p. 182.

admission, which we believe was due in many cases to too early removal and improper food on the journey. Of the 25 cases of relapse, the shortest interval that elapsed between the end of the primary attack and the commencement of the relapse was one day; the longest interval was 31 days, the average being 10·8 days. In Dr. Poole's cases, the longest interval was 24 days, and the average 9 days. Of 53 cases of Murchison's, quoted by Dr. Osler, the average interval was 11 days. In the Johns Hopkins Hospital cases the longest interval was 36 days, the average being 8·2 days. The shortest duration of the relapse was 6 days, and the longest 23 days; the average duration being 13·5 days. In Murchison's cases the average was 15 days. Two of our cases suffered from two relapses, and one from three. We had no deaths among the 25 cases of relapse included in these statistics, which bears out the general experience of low mortality among relapses.

Second attacks.—In 12 of our 262 cases there was a history of a previous attack, an incidence of 4·5 per cent. There were actually only 99 cases in which it was definitely stated in the notes whether the patient had or had not suffered from a previous attack. This would give a much higher incidence of second attacks, but as the fact of a previous attack not having occurred might not have been noted, we prefer to accept the percentage upon the whole of the cases. Dr. J. Dreschfeld, in his article in Clifford Allbutt's System of Medicine, states that at the Hamburg General Hospital, out of 2000 cases there were 14 in which there had been one previous attack, and one case in which there had been two previous attacks, or an incidence of 0·75 per cent.; while Berg only found one second attack in 1624 cases, or an incidence of 0·06 per cent. Our incidence is therefore extremely high, and this appears to correspond with the experience of others who have worked in South Africa. Brigade-Surgeon-Lieutenant-Colonel Alexander Crombie,* for instance, in the discussion upon Dr. Tooth's paper at the Clinical Society of London, states that of 150 officers who had returned invalided from South Africa for enteric fever, 6 per cent. had suffered from previous attacks. The frequency of second attacks in South Africa appears to be chiefly due to the intensity and frequency of exposure to infection. In England individuals are probably not often exposed to infection. The fatigue and privation experienced in South Africa would also be a predisposing factor in rendering individuals liable to infection. One of our patients had suffered from two previous attacks and died during the third. The remaining patients recovered. The following is a short account of these cases:—

No. 28.—The previous attack occurred seven years ago. The present attack was followed by relapse. The patient recovered.

No. 84.—The patient was an officer. The date of previous attack was not stated. The

* *The Lancet*, March 30th, 1901, p. 933.

patient was admitted towards the termination of the attack, which was followed by empyema. The patient recovered.

No. 103.—The previous attack was fifteen years ago. The present attack was attended by diarrhœa, spots, and enlargement of the spleen. The patient recovered.

No. 104.—The previous attack occurred when the patient was a child. The present attack was attended by enlargement of the spleen and by spots, and was complicated by otitis media. The patient recovered.

No. 160.—The patient was an officer. The previous attack occurred three or four years ago. The present attack lasted for twenty-six days and gave the serum reaction. The patient recovered.

No. 206.—The patient had had one previous attack as a schoolboy, and another during the campaign. The present attack was very severe and proved fatal.

No. 222.—The previous attack occurred one year ago. The present attack was attended by enlargement of the spleen and spots. The patient recovered.

No. 232.—The previous attack occurred in India, eleven years ago. The present attack was mild. The patient recovered.

No. 243.—The previous attack occurred three years ago, and the patient had been inoculated three times just before the onset. The previous attack was due to the accidental ingestion of the typhoid bacillus in experimental work. The present attack was severe. The patient recovered.

No. 279.—The previous attack occurred in Egypt eight years ago. The present attack was accompanied by spots. The patient recovered.

No. 300.—The previous attack was in April, 1900. The patient was inoculated in January, 1900. The present attack was sharp, and was accompanied by enlargement of the spleen, by diarrhœa, and by copious spots. The patient recovered.

No. 54.—The previous attack occurred four or five years ago. The present attack was followed by definite relapse. The patient recovered.

The Influence of Inoculation upon the Course of the Disease.—In 211 of our cases it was definitely recorded whether the patient had been inoculated or not. 186 of these cases had not been inoculated, with 20 deaths, or a mortality of 10·7 per cent.; 25 had been inoculated, with 4 deaths, or a mortality of 16 per cent. The mortality was thus higher among the inoculated than among the non-inoculated. At the Portland Hospital, 54 cases were inoculated, with 4 deaths, and 178 not inoculated, with 25 deaths. At the Imperial Yeomanry Hospital in Pretoria there were 27 cases inoculated, with no deaths, and 115 cases not inoculated, with 6 deaths. At the Scottish Hospital there were 15 inoculated, with 1 death, and 'about' 77 not inoculated, with 10 deaths. At the Edinburgh and East of Scotland Hospital there were 18 cases inoculated, with no deaths, but it is not definitely stated how many patients died among the non-inoculated. Adding together the cases at Deelfontein, Pretoria, the Scottish Hospital, and the Portland Hospital, we find that there were in all 121 cases inoculated, with 9 deaths, a mortality of 7·4 per cent.; and 556 not inoculated, with 61 deaths, a mortality of 10·9 per cent. In dealing with such small numbers, the difference between 10·9 and 7·4 per cent. is too slight to point to any marked beneficial influence of

inoculation upon the course of the disease. In our own series the mortality is greater among the inoculated than among the non-inoculated.

The Influence of Inoculation upon the Incidence of the Disease.—In our staff there were 44 nursing sisters; of these, 40 were inoculated, and 2 contracted enteric fever; 4 were not inoculated, and none contracted the disease. There were 10 ward-maids, all of whom were inoculated, and 1 contracted enteric fever. There were 20 medical officers; of these, 9 were inoculated, and 1 contracted enteric fever; 11 were not inoculated, and none of these contracted the disease. There were 10 dressers, none of whom were inoculated, and 4 contracted enteric fever. Taking the staff altogether, there were 59 inoculated, of whom 4 contracted enteric fever, and there were 25 not inoculated, of whom 4 also contracted the disease. It will be noted that the 4 of the non-inoculated who contracted the disease came from among the dressers, who were younger than the rest of the staff. At the Irish Hospital, quoted by Professor A. E. Wright, 64 of the staff were inoculated, and 2 contracted enteric fever; 4 were not inoculated, and none of these contracted it. At the Imperial Yeomanry Hospital, Pretoria, 35 persons were inoculated, and 6 contracted enteric fever; 115 were not inoculated, and 16 contracted the disease. At the Portland Hospital, 28 were inoculated, and 7 contracted enteric fever; 13 were not inoculated, and 3 contracted the disease. At the Edinburgh and East of Scotland Hospital, all (namely, 58) were inoculated, and 9 contracted enteric fever. Taking all these together, we find that there were 244 inoculated, with 28 cases, an incidence of 11·4 per cent., while there were 157 not inoculated, with 23 cases, an incidence of 16·4 per cent. The difference between the incidence of enteric fever amongst the inoculated and the non-inoculated is too small to be ascribed to any protective influence exerted by inoculation. We have not included the statistics of the Scottish Hospital, as the exact number of inoculated and non-inoculated is not definitely stated. The not infrequent occurrence of second attacks of enteric fever renders us doubtful of the prospect of successful inoculation in the future. The considerable risks of contracting enteric fever incurred in hospital work during this campaign are well exemplified by the above figures. Of a total of 401 persons engaged in attending the sick, 51 suffered from the disease, an incidence of 12·7 per cent.

Hæmorrhage.—We have included under hæmorrhage only those cases in which several ounces of blood were passed. There were in all 16 cases, an incidence of 6·1 per cent. At the Imperial Yeomanry Hospital in Pretoria there was an incidence of 8·7 per cent.: in Dr. Osler's cases 6 per cent.; in Dr. Goodall and Dr. Washbourn's cases 7·9 per cent., in Dr. Caiger and Dr. Goodall's cases 8·6 per cent., and in the Maidstone cases 5·5 per cent. Our incidence appears thus to be about the average. Of our 16 cases 8 died, a mortality of 50 per

cent., and 5 others were noted as being exceedingly severe cases. Dr. Rolleston states that of 21 cases at the Pretoria Hospital 16 died, a mortality of 76 per cent. It thus follows that in South Africa hæmorrhage in enteric fever is a symptom of grave signification. In England and America the mortality does not appear to be so high; in Dr. Poole's cases there were two deaths, a mortality of 20 per cent., and in Dr. Osler's cases the mortality was 10 per cent. In the majority of our cases—namely, in 13 out of 16—the patients suffered from diarrhœa.

Phlebitis.—There were 15 cases of phlebitis, an incidence of 5·6 per cent. At the Edinburgh and East of Scotland Hospital the incidence was 6 per cent. Lieutenant-Colonel Crombie* states that 25 per cent. of his cases suffered from phlebitis, but this high incidence appears to be due to the fact that many of his cases were invalided home on account of the supervention of this complication—a circumstance which vitiates his statistics. In Dr. Poole's cases the incidence was 3·8 per cent., in Dr. Caiger and Dr. Goodall's cases 3·4 per cent., and in Dr. Osler's cases 1·9 per cent. It thus follows that the incidence of phlebitis in South Africa is greater than in England or America. In our cases the left leg was affected 10 times, the right leg 4 times, and both legs twice. The phlebitis ensued during convalescence 8 times, during the pyrexial stage of the primary attack 4 times, during a relapse twice, and in one case the date was not noted. When occurring during the pyrexial stage it was towards the end of that period, the earliest appearance being on the sixteenth day. The latest date of its appearance after the end of the pyrexial stage was 30 days. It is probable that some cases developed phlebitis after leaving the hospital, but of these we have no record.

Pneumonia.—There were 10 cases of pneumonia, an incidence of 3·05 per cent. In Dr. Caiger and Dr. Goodall's statistics the incidence was 3·2 per cent., in Dr. Osler's statistics it was apparently 2·05 per cent., at the Pretoria Hospital it was 2·2 per cent., and at the Edinburgh and East of Scotland Hospital it was 1·3 per cent. The incidence thus appears to be about the same as in other statistics. Of our 10 cases 5 died, a mortality of 50 per cent., and at the Pretoria Hospital there was a similar mortality—namely, 2 deaths out of 4 cases.

Pleurisy.—There were 10 cases of pleurisy, an incidence of 3·05 per cent. In one of these cases there was effusion, which resolved, and in another case an empyema developed which had to be operated upon. In the Maidstone epidemic the incidence of pleurisy was 2·2 per cent., and in Dr. Caiger and Dr. Goodall's cases it was 2·6 per cent.

Bronchitis.—Bronchitis was not a marked feature of the attack. In 8 cases it was sufficiently severe to be specially noted.

* *Loc. cit.*

Periostitis.—There were 6 cases of periostitis, an incidence of 2·2 per cent. In the Maidstone cases the incidence was 5 per cent.; in Dr. Caiger and Dr. Goodall's cases it was 1·1 per cent. In 3 of the cases the tibia was affected, in 1 the femur, in one the index finger, and in 1 the transverse process of the atlas. They all, except one case, which occurred at the end of the pyrexial stage, developed during convalescence. The case in which the atlas was affected was an interesting one.

A painful swelling appeared in the parotid region, which was at first considered to be a parotitis. When opened by Mr. H. A. Ballance, the transverse process of the atlas was felt to be bare. The patient made a good recovery.

Condition of the Bowels.—Of the 234 cases in which the condition of the bowels is clearly stated, in 100 there was constipation, in 84 diarrhœa, in 41 alternate constipation and diarrhœa, and in 9 the bowels were regular. It will thus be seen that in 42·7 per cent. cases there was constipation throughout the attack. Dr. Poole states that 50 per cent. of his patients at Maidstone suffered from constipation, and Dr. Osler in his analysis of 829 cases at the Johns Hopkins Hospital states that 34 per cent. suffered from constipation. In the Edinburgh and East of Scotland Hospital 37 per cent. suffered from constipation. From these figures it would appear that constipation, not only in South Africa, but also in England and America, is much more common than is usually imagined. In the severer cases diarrhœa was most frequent, and of 35 of our fatal cases there was diarrhœa in 29, constipation in 4, and alternating constipation and diarrhœa in 2.

Perforation.—There were 6 cases of perforation, an incidence of 2·2 per cent. Dr. Dreschfeld gives an incidence of from 2·5 per cent. to 3 per cent.; Dr. Caiger and Dr. Goodall, 4·9 per cent.; Dr. Goodall and Dr. Washbourn, 3·1 per cent.; Dr. Osler, 2·7 per cent.; and at the Edinburgh and East of Scotland Hospital the incidence was 2 per cent.

Cardiac Complications.—In many cases the pulse was exceedingly rapid, and the patient suffered from cardiac collapse out of proportion to the severity of the attack. We attributed these cases to previous fatigue. Dr. Rolleston calls attention to the rapidity of the heart occurring during convalescence in patients who have been over-fatigued before the attack. We have also noticed the same during convalescence.

Convulsions.—In 2 cases there were well-marked convulsions, one of which we attributed to the administration of strychnine.

Case 1.—The patient died at the end of the second week of a severe attack. On the day preceding death there were pharyngeal spasm and retraction of the head. Nasal feeding, which was attempted, brought on general convulsions. No necropsy was made.

Case 2.—The patient died on the fifteenth day of the attack. On the eighth day there were general convulsions with opisthotonos and trismus, which subsided under morphia and chloroform. He had been taking for the previous thirty-six hours 5 minims of solution of strychnine every four hours. We attributed the convulsions to the strychnine. (Dr. Osler has described cases of convulsions occurring during enteric fever.)

Abdominal Pain.—In 15 cases a special note was made of the occurrence of abdominal pain during the attack. The pain was at some time so acute as to suggest perforation, and, indeed, in one case the abdomen was opened under this belief. The peritoneum was found to be perfectly healthy, and the patient made a good recovery. Most of these cases appear to have been simple colic. It is possible that in some of them there was slight peritonitis. Dr. Caiger and Dr. Goodall state that in 2·2 per cent. of the cases analysed by them the patients suffered from peritonitis without perforation.

Bladder Trouble.—Difficulty in micturition was noted in five cases at a time when the mental condition of the patient was perfectly good, and in some cases quite early in the disease. In one of the cases a catheter had to be used all through the attack, and in three cases on several occasions. In 2 other cases there was distinct cystitis. This list does not include the cases in which retention occurred while the patient was unconscious.

Parotitis.—There were 3 cases of parotitis, an incidence of 1·1 per cent. Dr. Caiger and Dr. Goodall give an incidence of 0·6 per cent., Dr. Poole an incidence of 0·5 per cent., Dr. Osler an incidence of 1·4 per cent., and at the Pretoria Hospital the incidence was 1·1 per cent. In 1 of our cases the parotitis was double and suppurative; the patient died. The other two cases were unilateral, one being suppurative and the other non-suppurative; both recovered.

Pharyngo-tonsillitis.—There were 10 cases, an incidence of 3·5 per cent. In some of the cases there was exudation upon the tonsils of a follicular character.

Abscesses.—In 1 case two small abscesses developed, one in the right inguinal region and the other in the peri-anal tissue.

Gangrene of the Skin.—In 1 case local necrosis of about the size of a florin occurred in two places—on the anterior surface of the right thigh and over the right tibia. The patient recovered.

Appendicitis.—In 2 cases enteric fever immediately followed a definite attack of appendicitis. In 1 case the patient recovered, but the other was fatal. Post-mortem, adhesions around the appendix, distended with muco-pus, were found in addition to the typhoid lesions. In another case, not included in our statistics, suppurative appendicitis followed an attack of enteric fever. Recovery ensued after operation. In the Edinburgh and East of Scotland Hospital a mild attack of appendicitis supervened in 1 case.

Eruptions.—In some of the cases the typhoid eruption was exceptionally profuse. In 2 cases a scarlatiniform eruption occurred which was attributed to an enema. In 2 cases there was a distinct *tâche bleuâtre.* In 6 cases purpuric spots appeared on the skin, especially on the limbs; 3 of these cases were associated with spongy gums, and in 1 case there were frequent and profuse hæmorrhages.

Secondary Fever.—Temporary rises of temperature occurred in a large number of cases. In many of these cases the fever appeared to be due to constipation.

Otitis Media.—There were 4 cases, an incidence of 1·5 per cent.

Pericarditis.—There were 3 cases, an incidence of 1·1 per cent.

Hepatitis.—In 1 case there was hepatitis. The patient had a great and uniform enlargement of the liver, with slight icterus during the pyrexial period. Abscess was suspected, but the enlargement subsided with the defervescence. The patient had not suffered from dysentery previously. Dr. Rolleston mentions a case of solitary liver abscess following enteric fever in a patient who had not previously suffered from dysentery, and who recovered after operation. Dr. Osler reports a case of enlargement of the liver which subsided and ended in recovery.

Jaundice.—This occurred in only 2 cases, and was associated in one case with fatal pneumonia, and in the other with hepatitis.

Orchitis.—There were no cases of orchitis.

Dysentery.—There were 21 cases of dysentery occurring either during the attack of enteric fever or shortly before or after it. In 6 of these cases the dysentery preceded the attack, and all of the patients recovered; in 4 cases the dysentery occurred during the attack, and 2 of the patients died; while in 11 cases the dysentery occurred during convalescence, and 4 of these patients died. It would thus appear that dysentery arising either during the attack or during convalescence is of serious signification, the mortality being 33·3 per cent.

Malaria and Rigors.—In 11 cases definite rigors occurred during the attack. In 2 cases the malarial plasmodium was found, and probably was present in a third, the patients at the same time giving the serum reaction. Dr. Poole noticed rigors in 8 of his cases, an incidence of 3·8 per cent.; and Dr. Osler has specially called attention to their occurrence. Omitting the definite malaria cases, our incidence was 3·05 per cent. The following is a history of the 11 cases:—

Case 1.—This was a severe and prolonged attack of enteric fever, the pyrexia lasting for nine weeks. During the fourth week there were daily rigors without apparent cause. The patient was attacked with phlebitis three weeks after the first rigor. The patient recovered.

Case 2.—This was a severe attack, the pyrexia lasting for twenty-five days. There were rigors on the sixth, seventh, and eighth days of the disease. Pneumonia developed nine days after the

first rigor, and phlebitis nine days later. This patient had had malaria before. The patient recovered.

Case 3.—The patient had been ill for several weeks before his admission, and he died on the sixth day after admission. While in the hospital he had several rigors.

Case 4.—This was a severe attack, the fever lasting for four weeks. Rigors occurred on the last day of pyrexia, and again on the fourth, seventh, and tenth days of convalescence. The patient recovered.

Case 5.—This was a severe attack, lasting for sixty-three days. Several rigors occurred during the attack without definite cause. The patient recovered.

Case 6.—This was a moderately severe attack, lasting for twenty-seven days. Several rigors occurred nine days after phlebitis had developed. Nine days later the patient was attacked with otitis media. The patient recovered.

Case 7.—Rigors occurred during an ordinary attack without any definite cause. The patient recovered.

Case 8.—The patient died from fever at the end of twenty-one days. Several rigors occurred during the attack.

Case 9.—This was a mild attack, the fever lasting about eleven days. There were rigors on the last two days of pyrexia. Doubtful malarial parasites were found in the blood. The patient recovered.

Case 10.—This was a severe attack, the pyrexia lasting for fifty-nine days. The patient had had several rigors; malarial parasites were found in the blood. He had suffered previously from malaria on the West Coast of Africa.

Case 11.—The patient had been ill for some weeks before admission into the hospital, where he suffered from pyrexia for eighteen days. Malarial parasites were found in the blood, and it gave the serum reaction. The patient recovered.

Arthritis.—There were 9 cases of arthritis, an incidence of 3·4 per cent. In 2 cases there was effusion, and in one of these the exudate became purulent. The following is a short account of these 9 cases:—

Case 1.—On the third day of convalescence there was pain in the fingers, shoulders, and knees, without effusion and without rise of temperature. Similar pain recurred on the nineteenth day of convalescence.

Case 2.—There was pain in the hips and ankles occurring on the ninth day of convalescence; this subsided in a few days.

Case 3.—This was a severe attack of enteric fever with petechiæ and spongy gums, followed by a relapse. Pain occurred in the right elbow, with effusion and redness. The temperature went up to 104·2° F., and there was a slight fever for the next two days. The inflammation subsided in about a week.

Case 4.—On the fourteenth day of convalescence pain occurred in the left shoulder and arm, with slight pyrexia lasting for two or three days.

Case 5.—On the twelfth day of convalescence there was pain in the right arm, hand, and ankle, the temperature being 103° F. Pyrexia lasted for about six days. There was a similar attack a month later, which lasted for seven days.

Case 6.—On the last few days of the pyrexial stage pains occurred in the knees and elbows, lasting for several days.

Case 7.—During the pyrexial stage pains occurred in the back, shoulder, and ankle, and lasted for two or three days. This patient had had rheumatic fever before.

Case 8.—During convalescence rheumatic pains occurred in the right arm. This patient had previously suffered from rheumatic fever.

Case 9.—This case ended fatally; and showed on post-mortem examination, besides the characteristic lesions of enteric fever, suppurative arthritis of the left knee, with disorganization of the joint.

It will be observed that in cases 7 and 8 the patients had previously suffered from rheumatic fever, which was doubtless the cause of the arthritis. But in the others no cause other than enteric fever could be ascertained. Most of them occurred during early convalescence. The arthritis may be compared to that arising in scarlet fever—a comparison which is supported by the occurrence of suppurative arthritis in a case of which we have only the notes of the post-mortem examination.

Epistaxis.—Epistaxis was very frequent during the early stage.

Tender Toes.—There were a good many cases of 'tender toes,' such as have been described by Dr. Handford. The toes were excessively tender, requiring a cradle to keep off the pressure of the bed-clothes. There was no swelling, and they all recovered.

Conclusion.—From a survey of the above cases we conclude that the type of Enteric Fever met with in South Africa does not differ in any essential particular from that met with in England and America. The mortality and the incidence of complications are much the same as in the variations which are met with elsewhere. The only complication which appears to be specially prominent is phlebitis, which occurred in 5·6 per cent. of our cases. This is higher than in Dr.. Poole's cases at Maidstone, and in Dr. Caiger's and Dr. Goodall's cases at the Metropolitan Asylums Board Hospitals, which showed a percentage of 3·8 and 3·4 respectively. For other complications and sequelæ our figures vary but little from those quoted for other epidemics.

There are, however, certain minor points on which our cases show divergence from the more ordinary forms of Enteric Fever seen in this country. But these may, we think, be accounted for by the local conditions influencing its growth and spread, rather than by any inherent difference in type of the disease. The real point of contrast is not so much between British or American and South African Typhoid Fever, as between Typhoid Fever as it occurs in a civil population in time of peace and the same disease as it occurs in an army in the field. The conditions of active service are entirely different from those of civil life, and are of themselves sufficient to account for minor differences in the manifestations of disease.

The following points (quoted from Dr. Crombie's speech at the meeting of the Clinical Society on March 22, 1901, Trans. Clin. Soc., vol. xxxiv., p. 127)

may be taken as illustrative of the chief points of divergence between the two forms of Enteric Fever:—

(1) The frequency of Thrombosis.
(2) The frequency of second attacks.
(3) The profuseness of the Rash.
(4) The frequency of Muco-colitis.

(1) The frequency of thrombosis has already been referred to. Our figures of 5·6 per cent. probably under-estimate the frequency of the condition, as a certain number of our cases in all probability developed phlebitis after leaving the hospital, and our list being confined to cases running an acute course at Deelfontein, does not contain those who developed the condition with us after transference from hospitals nearer the front. Of these there were a considerable number. On the other hand 25 per cent. is probably too high. This figure was arrived at by Dr. Crombie from an analysis of cases under his care in this country, invalided home on account of the disease. The fact that from an early period in 1900 Enteric convalescents were not sent home, unless they showed complications rendering them unlikely to be fit for field service in a short time, would tend to vitiate any statistics compiled at home. The privations undergone by the men, many of whom marched during the early days of their attack, would, in our opinion, be sufficient to account for the greater preponderance of this complication. There appears also to be something in the food—the absence of fresh vegetables or the presence of some ingredient in tinned foods—which predisposes to phlebitis.

(2) The frequency of second attacks. We have already alluded to this point, and it would appear probable that the intensity of exposure to infection is sufficient to account for the undoubted preponderance of second attacks of enteric fever in the campaign. It is, one would suppose, comparatively seldom that a person in this country who has suffered from enteric fever is exposed to the risk of a second infection. In the South African epidemic, on the other hand, practically every man of the Field Force was more or less constantly exposed, for months at a time, to a very serious risk of enteric infection. It is to be noted also that the condition of the men during the greater part of this time was such as would render them peculiarly susceptible to invasion by any infectious disease. Further, it is possible that the frequency of second attacks at home has been underestimated. It is a point on which diligent inquiry does not appear to have been made except in the case of a few notable epidemics.

(3) The profuseness of the rash was a point of frequent comment, and did not seem to bear any relation to the severity of the attack. But this also may

be accounted for by the condition of the patients better than by any peculiarity of the disease. In the early part of the campaign it was unusual to find any man in hospital without a rash of some sort, irrespective of the disease or injury for which he was admitted. Phthiriasis appears to be, and to have always been, inseparable from the conditions of warfare. It is not suggested that this skin affection was in any single instance mistaken for the characteristic spots of enteric fever, but it seems reasonable to suppose that the irritable and hyperæmic condition of the skin in this affection may account for greater profuseness of the specific rash, just as, to a greater extent, the application of a poultice to the skin will determine the appearance of the rash in any of the Exanthemata.

(4) The frequency of muco-colitis does not appear very striking from the analysis of the cases above quoted, although it was a prominent feature in certain parts of the country, or perhaps more correctly at certain periods of the campaign. It should, however, be remembered that muco-colitis was perhaps the commonest affection in the army in South Africa, and one from which a very large proportion of the men suffered at one time or other. Indeed few escaped altogether, and many suffered during the greater part of their stay in the country. It is, therefore, not surprising that typhoid statistics show a frequency of muco-colitis altogether greater than that met with in home-bred enteric.

There is another peculiarity which has to be mentioned—viz., the large number of mild, indefinite, and more or less abortive cases. These will be referred to elsewhere,* and it is sufficient to say that these cases occurred for the most part in the cold weather, when the intensity of infection is much lessened, and late in the campaign when the men had become 'hard,' when the privations and exhausting marches had greatly diminished, and when their food was more abundant and more suitable to their wants.

On the whole, therefore, we are inclined to close this section by repeating the statement with which it opened—viz., that in our opinion the type of enteric fever met with in this campaign does not differ in any essential respect from that met with in England and in America, and that the differenees in its manifestations to which reference has been made may be accounted for by differences in the conditions under which the fever spread and developed, conditions which are inseparable from active service; and that it is unnecessary to invoke any difference in type of the disease to explain their occurrence. It is interesting to note that civil practitioners in South Africa do not appear to find any marked variations in the enteric which they encounter in their ordinary work from that which they were accustomed to see in England. We have no statistics to offer on this point, but the statement may be taken as a very distinct impression left on our

* *Vide* p. 31.

mind as the result of frequent conversations on the subject with local medical men.

We do not feel that anti-typhoid inoculation has any marked influence either in preventing or in modifying the disease.

Dysentery.

Considerably over 500 cases of dysentery in one or other stage were treated in the hospital. Many, perhaps the majority, had passed through their acute stage elsewhere, but a large number were admitted in the early days of the attack, and a few developed the disease soon after admission. As many of the case-records have not reached this country it has been found impossible to make a complete analysis of all the cases. The first 250 cases admitted into the hospital were, however, carefully analysed by one of us, assisted by Mr. Owen Richards,* and the results may be taken as representative of the whole number. This list includes twenty cases which ran their whole course in the hospital.

For convenience of description the cases may be divided into four classes—A, B, C, and D.

Class A.—These cases are unattended by pyrexia; the other symptoms are similar to those in Class B—that is, the passage of blood and slime. Four of our twenty cases belonged to this class; they were readily amenable to treatment, three of the patients recovering in 3, 5, and 6 days respectively, while in the fourth case, which was of longer duration, the patient was twice discovered taking improper food. In a fifth case, which recovered in five days, there was pyrexia for one night only, the temperature reaching 101·4°.

Class B.—Of our 20 cases, 14 belonged to this class, which is characterised by a fairly definite pyrexial stage, reminding one of the course of a specific fever. The pyrexia, which is irregular in type, reaching 101° to 103°, with morning remissions, starts at the commencement of the attack, and lasts about 6 days—in the 14 cases 4, 3, 6, 4, 6, 4, 5, 8, 8, 6, 8, 5, 6, and 8 days respectively. The onset is frequently preceded by ordinary diarrhœa lasting a day or two. The principal symptoms of the attack are tenesmus with repeated calls to stool, and the replacement of the normal fæcal evacuations by blood and slime. In favourable cases, as the temperature falls the evacuations gradually assume a more fæcal character, and an ordinary diarrhœa persists for a day or two longer, the whole attack lasting about 9 days.

Chart 1 shows the course of the temperature and the number of evacuations

* Owen Richards and Washbourn. *British Medical Journal*, 1900, Vol. II., p. 668.

in a typical case of this class ending in recovery. The patient, Private S., a previously healthy man, was treated with magnesium sulphate.

Of these 14 cases, in 5, who were convalescing from disease other than enteric, the course of the attack corresponded very closely with the above case. In two others who were convalescent from enteric, diarrhœa continued for 17 and 21 days. In the ninth case, Private A., the symptoms began in the usual way, with pyrexia lasting for 7 days. Shortly after the fall of the temperature the motions became fæcal. The diarrhœa, instead of subsiding, continued for five weeks, the bowels being open on an average nine times a day. He became much emaciated, and the abdomen was retracted. Recovery ultimately ensued. He was treated with ipecacuanha, magnesium sulphate, opium, and bismuth. This patient was convalescent from enteric fever at the time when he

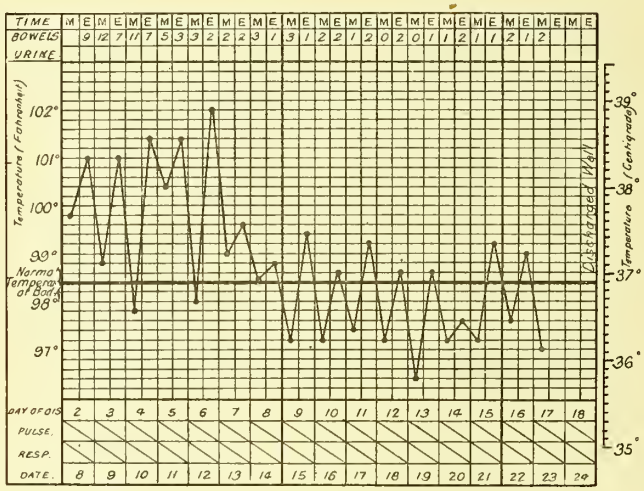


CHART I.

was attacked, which probably was the cause of the protracted course of the disease. The remaining five cases in this class, who were all convalescent from enteric fever, ended fatally.

The attack began with the usual pyrexial stage. In one case death occurred on the 7th day, before the fall of temperature, and in the others after the temperature had subsided, on the 11th, 12th, 13th, and 14th days of the attack respectively.

This unfavourable course was, we believe, due to the lowered resistance consequent on the attack of enteric fever. In two of the cases typhoid ulcers were found at the necropsy, in another there was still evidence of enteric in the enlargement of the spleen and mesenteric glands, and in the other two the patients were much enfeebled before the dysentery commenced.

The Charts II., III., IV., and the following brief notes, illustrate these cases :—

Private T. S., admitted on May 13th, convalescent from enteric, temperature having been normal for four days. On May 19th he suffered from diarrhœa, and on May 20th he began to pass blood and slime, the temperature rising to 101·4°. In spite of treatment, the dysenteric symptoms continued, and the pulse gradually failed. He died on May 26th. At the post-mortem examination, dysenteric ulceration was found in the rectum, sigmoid flexure, and cæcum, together with small patches in the rest of the colon. The lower end of the ileum was inflamed; the spleen and the mesenteric glands were enlarged. The patient was treated with ipecacuanha, opium, and astringents.

Private O., admitted on May 5th, suffering from relapse of enteric. The relapse was severe,

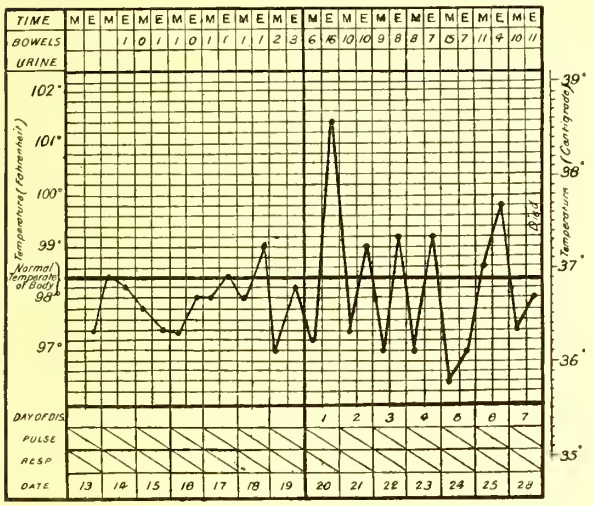


CHART II.—CASE OF PRIVATE T. S.

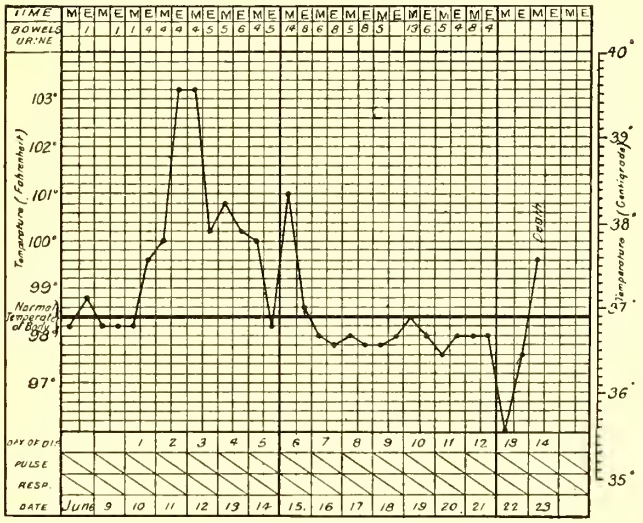


CHART III.—CASE OF PRIVATE O.

temperature varying between 103° and 104°. It became normal on May 23rd, and continued so until June 10th, when it rose to 99·6° in the evening. On this day the patient suffered from diarrhœa. On the 11th it reached 103·2° in the evening; diarrhœa continued. The motions were at first fæcal, and subsequently consisted of nothing but blood and slime. The temperature became normal on June 16th; the dysentery continued; hiccough developed, and persisted during the last five days of life. The patient died on the 23rd. No post-mortem examination was made. The patient was treated with opium, bismuth, ipecacuanha, and magnesium sulphate.

Private P., admitted May 24th, had been ill twenty-four days with enteric, temperature having been normal for more than a week. His temperature remained normal till May 29th. On May 30th his bowels were open twelve times, and he passed blood and mucus. On June 2nd the bowels were opened constantly, with passage of blood and slime, which continued till he died. On June 3rd his pulse was very feeble. On the 4th he suffered from great thirst, and the abdomen became retracted. He rapidly emaciated, and died on June 11th. At the post-mortem examination the whole of the large intestine and the lower two feet of the ileum were acutely congested and thickened, and there was severe dysenteric ulceration, most marked in the rectum. On the first day of the attack he was treated with ipecacuanha (two doses, 30 gr. each), followed by

opium and bismuth; on the fourth day with magnesium sulphate; and on the fifth day ipecacuanha was again tried. At various times morphine suppositories, copper sulphate, and different preparations of opium were administered.

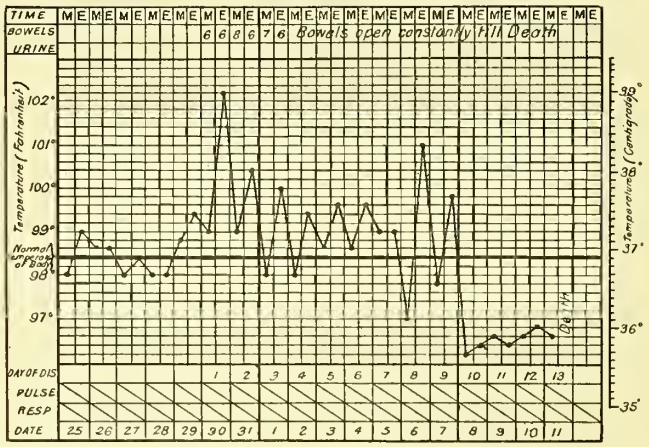


CHART IV.—CASE OF PRIVATE P.

Complications.—In the case of Private A. above quoted the diarrhœa, instead of ceasing about the tenth day, continued for five weeks, and it is probable that many of the numerous cases admitted into the hospital, some time after the commencement of the attack, were cases of this nature reaching us after the pyrexial stage had passed. In some of these latter cases, however, the prolongation of the dysentery was due to a distinct relapse attended by the usual pyrexia—for example, the case of Private J. W. below quoted. In others it was due to a relapse unattended by pyrexia.

As regards other complications, perforation of the intestine and consequent peritonitis occurred in several cases, and in one or two a temporary enlargement of the liver with pyrexia occurred during convalescence. In another case, the enlargement of the liver was followed by hemiplegia, probably due to a cerebral thrombosis. The following is a short note of the case:—

Gunner G., admitted March 26th, had been ill six weeks with dysentery, with passage of blood and slime. On admission he was convalescent, but there was still some diarrhœa and passage of blood. This yielded to treatment with bismuth and opium. On April 2nd his temperature rose to 100·6° F., and continued at about this level till April 13th, when it rose to 103°. On this day the liver was observed to be slightly enlarged and tender. An intermittent temperature, varying between 103° and 98°, continued till the night of April 25th, when it suddenly rose to 105·8°, but fell within an hour to 97°. He became collapsed, with feeble pulse, recovering on administration of brandy. Later he grew restless, shaking his head from side to side, and for a time became semi-conscious. On the morning of April 26th his temperature was normal, and he was very drowsy. Well-marked paresis was present in the right arm and leg, with slight blurring of the optic discs. From this time he gradually recovered, and there was no subsequent

rise of temperature. By May 21st he was walking about, but still had some loss of power in the right arm and leg.

As these cases were not seen from the commencement, we are uncertain to which of our classes they belong. In the following case, however, which from the nature of the relapse appeared to belong to Class B, the enlargement of the liver was due to the formation of an abscess. (See Chart V.)

Private J. W., admitted May 5th, had had dysentery twice before during the previous six months. The present attack began on March 26th, with passage of blood and slime, at which time he stated that his temperature was raised—on one occasion to 101° F. For ten days before admission, the bowels had been normal. On May 10th, five days after admission, he had a relapse of dysentery,

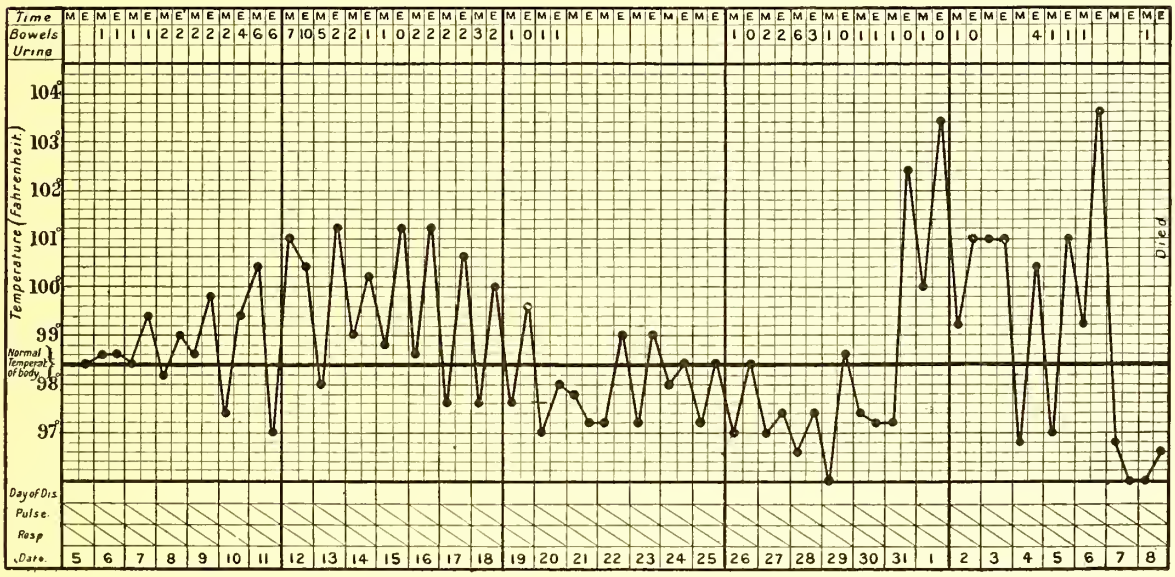


CHART V.

his temperature being raised to 101°. The temperature continued raised till May 19th, by which time the dysentery had ceased. The temperature then fell, and remained nearly normal till May 31st, when it rose to 102·6°. The liver subsequently became enlarged, and pleurisy developed on the right side. On June 8th Mr. Raymond Johnson opened an abscess in the upper part of the right lobe of the liver. This, however, did not relieve the patient, who died the same day. At the post-mortem examination, extensive dysenteric ulceration was found in the large intestine, and a second abscess was discovered in the lower part of the same lobe.

This is the only case of hepatic abscess which has been observed in this hospital. In several cases arthritis was noted. There was effusion of fluid into the joint, but in no case did suppuration result. The joints affected were most frequently the knees, one or both.

Class C.—We have notes of only three cases of this class, none of which were

seen from the beginning. From the accounts given by the patients the attacks began with the usual symptoms of dysentery, namely, the passage of blood and slime. The patients had been ill 7, 10, and 12 days before admission. Subsequently to admission the symptoms were diarrhœa, with motions of a brown colour, accompanied by pyrexia, and lasting for 24, 25, and 19 days respectively. In each case the course of the temperature and the character of the diarrhœa raised the suspicion of enteric. In two of these cases this view was strengthened by the enlargement of the spleen. None of the cases, however, gave a serum reaction with the typhoid bacillus in a dilution of 1 in 20, and the general condition of the patient and the appearance of the abdomen were not like those found in enteric; in fact, in two of the cases the abdomen was distinctly retracted.

Chart VI. and the following short notes illustrate this type:—

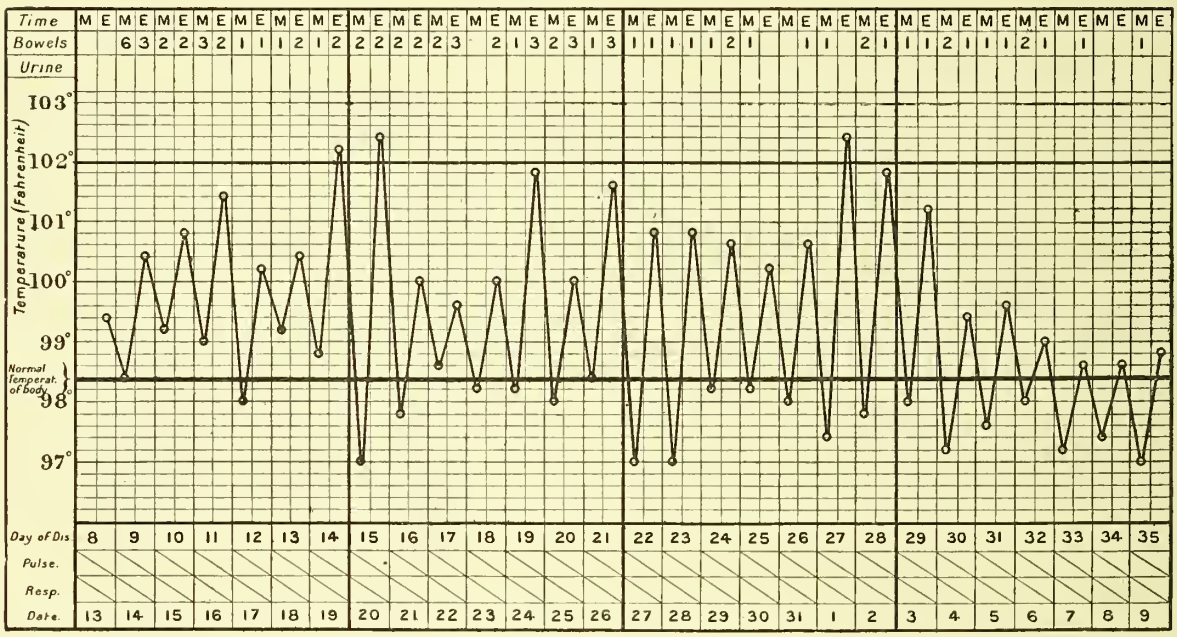


CHART VI.

Quartermaster-Sergeant L. was admitted on May 13th. He had been ill for a week with abdominal pain and straining, and the passage of blood and slime. The onset was marked by continued vomiting. On admission the temperature was raised, and pyrexia continued for over three weeks (*vide* chart). He suffered from diarrhœa, the motions being of a brownish colour, but neither blood nor slime were passed. On May 22nd a sausage-shaped swelling, probably due to thickening of the intestine, was to be felt in the situation of the sigmoid flexure, and continued to be felt for a week. On June 4th the temperature began to fall, and on June 7th it was normal. As the temperature fell, the motions became formed, and the patient became convalescent. On June 7th, his blood was tested, and failed to give the Widal reaction in a dilution of 1 in 20. He was treated with opium, bismuth, ipecacuanha, and salol.

Class D.—We have only seen one case of this class, but as it was seen from the beginning of the attack, and a post-mortem examination was made, it is especially instructive. During life the case was considered to be one of enteric fever. This diagnosis was supported by the fact that his blood gave the typhoid reaction.

He was in hospital for nineteen days, having suffered for a week previously from malaise. The pyrexia was similar to that of a case of enteric fever; the bowels were at first constipated; subsequently there was diarrhœa; the motions were of a brown colour. At no time was blood or slime observed in them. He died of peritonitis caused by perforation of the large intestine, and at the post-mortem examination typical dysenteric lesions were found. The following are brief notes with Chart (VII.) of this case:—

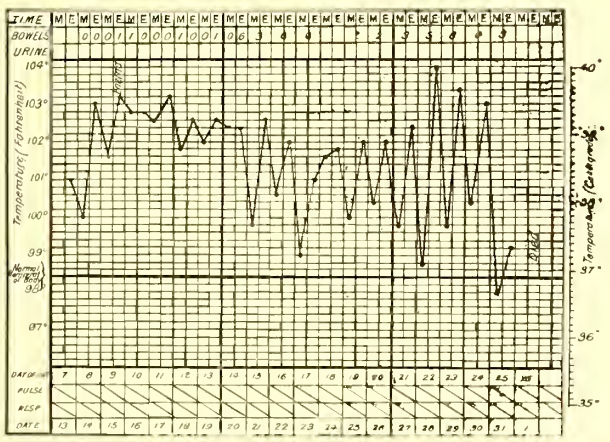


CHART VII.

Orderly H., admitted into hospital May 13th. Had been ill for a week with cold in the head, aches and pains, and feverishness. Two days previously there had been slight diarrhœa and tenderness of the abdomen. Temperature was 101° F. on admission. The spleen was not felt. The tongue was thickly coated with yellowish fur.

May 15th.—Bowels have not been opened since admission. An enema given. There is retention of urine, requiring the use of a catheter. Patient's blood gave an immediate Widal reaction to day with a dilution of 1 in 20.

May 18th.—Abdomen tumid. Enteric fever diagnosed.

May 20th.—Complains of headache and pains in the back. Still retention of urine.

May 21st.—Still abdominal pain.

May 24th.—Has had diarrhœa for several days. There is a rash over the trunk and arms, probably due to administration of urotropin.

May 26th.—Rash gone. Still diarrhœa. The patient frequently vomits. Low muttering delirium.

May 28th.—Abdomen distended.

May 31st.—Distention of abdomen enormously increased. Liver dulness absent. Continues

to vomit. The pulse gradually failed, and the patient died on June 1st. He was treated with bismuth, urotropin, morphine, nux vomica, and digitalis. At the post-mortem examination, the peritoneum was covered with lymph; there was a large quantity of liquid fæcal matter and purulent fluid in the peritoneal cavity. Perforations were found in the sigmoid flexure, descending, and transverse colon. The intestines were matted together. The mesenteric glands of the small intestine were normal, whilst those of the large intestine were slightly enlarged. The large intestine was slightly thickened, the mucous membrane congested, of a greenish-black colour, with numerous petechiae. There were a great number of minute punctate ulcers with sharply cut edges, and several large ulcers from half to one inch in diameter, with ragged edges and gangrenous bases. About half a dozen of these large ulcers had perforated, the perforations being circular, and about an eighth of an inch in diameter. The whole of the large intestine was more or less affected, but the rectum, sigmoid flexure, and transverse colon had suffered more severely than the rest. The mucous membrane of the small intestine was pale, except the Peyer's patches, which were stained a purplish colour. Except for this coloration, there was no evidence that Peyer's patches had been affected. The liver was large, soft, and pale; the spleen was small.

Pathology.—We have examined microscopically the excreta in numerous cases of dysentery, and have never discovered amœbæ. The pus removed during life from the hepatic abscess above quoted contained no amœbæ. It contained, however, a large number of bacteria, of which some were bacilli belonging to the coli group, while others where streptococci.

Post-mortem examinations were made in nine cases of dysentery dying in the hospital. In three cases death was due to peritonitis from perforation; in one case death was due to hepatic abscess; in two cases, in addition to the dysenteric ulceration of the large intestine, there was recent typhoid ulceration in Peyer's patches; in the remaining three, the patients had recently suffered from enteric, though there was no ulceration of Peyer's patches obvious at the necropsy. The lesions in the large intestine were such as are usually described in dysentery, thickening of the wall with, in all cases, considerable ulceration. In some cases the whole of the large intestine was affected. In all cases the rectum was the part most severely ulcerated, and next to that the cæcum.

Remarks.—In the above description we have distinguished four clinical types of dysentery. And the question arises whether these types are simply clinical varieties of the same disease, or whether they are distinct diseases due to different causes.

The first type (Class A) appears to be simply a mild form, without much constitutional disturbance. The second type (Class B) seems to be a distinct clinical entity, with a powerful pyrexial stage, like that of a specific fever. In the cases which died, the fatal event appears to have been due to the lowering of resistance caused by recent enteric. Except for the result, the clinical course was similar in the whole of the cases forming this class. This view is supported by the fact that of the nine non-fatal cases the three most severe

occurred in patients convalescent from enteric. The single case in Class D ran a very different course to that of Class B. The symptoms were so similar to those of enteric fever, that a mistake in the diagnosis was made. The usual dysenteric symptoms—tenesmus and the passage of blood and mucus—were absent. The patient had not been inoculated, nor had he had a previous attack of enteric. His blood, nevertheless, gave the typhoid reaction. Unfortunately the highest dilution used was 1 in 20, and we know that with diseases other than enteric the reaction is sometimes obtained with this low dilution. There was no evidence of enteric at the post-mortem examination, and the Peyer's patches, except for a slight discoloration, appeared to be normal; the mesenteric glands and spleen were not enlarged. As the patient belonged to our detachment, we knew that there was no recent history of enteric. We have seen sporadic cases of ulcerative colitis in England running a precisely similar course.

The cases in Class C while under observation ran a somewhat similar course to the above case, and, indeed, in all of them the question of enteric was raised. The history of these cases, however, showed that they began with the usual dysenteric symptoms, and, viewed from a purely clinical standpoint, they would appear to form a link between Classes C and D. Without actual pathological evidence of the causation of dysentery it is impossible to assert whether these different clinical types belong to the same disease. Nevertheless, we have thought that an attempt to distinguish between clinical types may be of some assistance when the true pathology of this disease is more thoroughly investigated.

Treatment.—Many different drugs were tried in the treatment of this disease. Ipecacuanha and the sulphates of magnesium and sodium were perhaps the most frequently successful in acute cases. The former was given in doses of 20–40 grs. of the powdered root, preceded by a preliminary dose of opium, and a sinapism to the epigastrium. A second dose, generally smaller than the first, was given in three to six hours. In a certain number of cases rapid benefit resulted, but in many there appeared to be no effect whatever, even from repeated doses. The de-emetinised preparation proved to be distinctly inferior to the ordinary ipecacuanha.

Magnesium or sodium sulphate, in one drachm doses every hour for 8–12 doses, or until the stools became faeculent, in many cases acted well; but, as with the ipecacuanha, in others produced no apparent benefit. Of the two the sodium salt is preferable.

In many cases a preliminary dose of castor oil with twenty drops of laudanum was found to be useful before commencing any specific treatment. The following short notes illustrate these modes of treatment:—

Ipecacuanha.—Pte. D., admitted April 7th, had been ill a fortnight with dysentery. The bowels acted at first about twenty times a day, and blood and slime were passed. On April 8th

the bowels acted ten times, and there was blood in the motions. He was treated with ipecacuanha. On April 9th the bowels acted four times, and the stools contained no blood. On April 10th the bowels acted three times, and on April 12th twice, and there was no blood. On April 16th the motions were becoming formed, and on April 20th he was discharged well.

Magnesium Sulphate.— Pte. J. W., admitted on May 10th, had had two attacks of dysentery since landing in South Africa, and was admitted when his second attack had lasted a little over a month. The motions were frequent, contained blood and mucus, and were accompanied by abdominal pain and tenesmus. On May 10th the bowels acted seven times, and on May 11th ten times. On May 12th magnesium sulphate was begun in doses of one drachm. Six consecutive hourly doses were given, followed by two others at intervals of two hours. This was followed by a bismuth and opium mixture. On May 13th the bowels acted five times, on May 14th twice, and on May 15th once. The patient stated that after the first dose the abdominal pain and 'working' ceased, and in twenty-four hours there was neither blood nor mucus in the stools. There was no recurrence of the dysentery.

Sodium Sulphate.—Lieut. H., admitted February 18th, 1901, on the third day of disease. The bowels were acting 'about every half hour,' and the motions contained blood and slime. Pain and tenesmus were marked. The evening of admission a dose of castor oil and opium was given, and next morning hourly one drachm doses of sodium sulphate were begun. After the first few doses the pain and tenesmus diminished, the motions became less frequent but still small, and consisting entirely of 'meat washings' with mucus. On February 21st the stools were larger, and becoming fæculent. There was no pain and much less tenesmus. During the night the bowels had acted only once—after a morphia suppository—and no sodium sulphate had been given. The mixture was continued every two and then every four hours, and by the evening of February 24th there was no pain or abdominal tenderness, the motions were fæculent, partly formed, and free from blood or mucus.

Opium was found to be a useful adjunct in severe cases. When the pain and tenesmus were almost constant, and the call to stool frequent, opium enemata, or morphia in suppositories or by hypodermic injection gave great relief, and in a few cases appeared to turn the scale in favour of recovery.

In chronic cases, or after the more acute symptoms had subsided under any of the above modes of treatment, bismuth with opium in some form, and astringents, seemed to act best. In a few cases sulphuric acid and chlorodyne succeeded where other combinations failed.

The Sulphur treatment, advocated by Dr. G. E. Richmond, is referred to elsewhere (Pretoria Reports, p. 209).

An extensive trial of the so-called Native Remedies for Dysentery was made. The services of Boer farmers and native employés of the hospital were enlisted to secure specimens of the 'Cures.' Many different plants were brought in, each reported to be infallible. They were all tried, generally as decoctions or infusions, but no good effect was obtained. Many of the remedies appeared to possess mild astringent properties, but nothing further. Mention should, however, be made of the Monsonia Bilflora, specimens of which were obtained by the kindness of Mr. Medley Wood, Curator of the Botanic Gardens, Durban.

Preparations of Monsonia var. Ovata had been tried in many cases at Deelfontein without good result, and the drug had been given up. The tincture and infusion made from the var. Bilflora appeared to act well in a certain number of cases, although, as with all other methods of treatment, failures were not infrequent. Most of the cases treated by this drug were of mild grade or chronic.

Treatment by lavage of the bowel with antiseptic or astringent solutions was practised in only a few severe or prolonged cases. It was of distinct value in a certain number. The following is an illustrative case:—

Corpl. J., 79th Co. I.Y., was admitted on September 21st, 1900, convalescing from a severe attack of dysentery of seven weeks' standing. On the fifth day relapse took place. The temperature rose, and there was recurrence of abdominal pain and tenderness, with the frequent passage of small stools consisting chiefly of mucus. For the next four weeks the condition varied somewhat, but on the whole, in spite of treatment, became progressively worse. The temperature remained raised, and there was frequent vomiting. On October 25th the general condition is noted as 'bad'—the pulse was becoming intermittent, and there was blood in the motions. The patient had lost flesh to a surprising extent, and had been fed on several occasions by stomach tube. The treatment had consisted of ipecacuanha in large doses, monsonia ovata, bismuth, morphia, salol, Dover's powder, quinine, &c. On October 30th the bowel was washed out with weak boric lotion and a pint of sulphate of copper solution (1 gr. to 1 oz.) was injected, and retained for ten minutes. This procedure was repeated every second day, the amount of copper injection being gradually increased to two pints of a 2 gr. to 1 oz. solution. In all six injections were given. On November 3rd it was noted, 'The temperature has been steadily falling since copper sulphate injections were started, and the frequency of the motions has diminished. Patient feels "much better," and his general condition has certainly improved.' The improvement was maintained, and by November 7th the actions had fallen to one or two in twenty-four hours. The appetite steadily improved, and strength and weight were rapidly regained.

Scarlet Fever.

The first case of Scarlet Fever in our hospital was noted on April 23rd, 1900. It had been known for some time that the disease had occurred to the north of Deelfontein, notably at Naauwpoort, and careful observation for imported cases had been made, but none had been detected. On the date mentioned a patient in one of the huts was found to be desquamating. A number of cases appeared after this time among our own orderlies and among the patients of the hospital, while others arrived at hospital desquamating, or commenced to desquamate a few days after admission. The cases were all of a mild type and gave rise to no anxiety. Isolation measures were adopted on the discovery of the first case, a separate camp being opened on the veldt a quarter of a mile outside the hospital lines. Special orderlies, who had suffered from the disease, were told off, and there was no direct communication between the camp and the hospital. The cooking for the patients was carried out in the camp; rations, &c.,

being deposited in the open by a special 'runner,' and taken thence to the camp by one of its inmates. All utensils were carefully disinfected in the camp before their return into the hospital lines. The beds, bedding, and personal belongings of the infected patients were removed from the hut or tent in which they had been living, and thoroughly disinfected. In spite of these measures sporadic cases continued to appear, and at last it became necessary to establish a quarantine camp at some distance both from the hospital and from the scarlet fever cases. Two marquees were pitched and equipped, and on the occurrence of a case of scarlatina in the hospital, after the patient had been removed to the scarlatina camp, the other occupants of the hut or tent were transferred to these marquees, where they were kept under observation for ten days. During that time the hut or tent and its contents were thoroughly disinfected, and on the conclusion of the quarantine period the 'contacts' returned to the hospital lines. Shortly after this additional safeguard was adopted no fresh cases arose in hospital. The following notes are illustrative of the cases: —

Case 1.—On April 23rd, 1900, Trooper H. was found to be desquamating. He was admitted into Naauwpoort Hospital on April 5th, where he was operated on for adenoids, and was transferred to Deelfontein on April 10th. On admission he complained of rheumatic pains, his throat was congested and raw (the operation had taken place two days previously), but there was no rash. No symptoms of scarlet fever developed until April 23rd, when desquamation was observed. He had been up and mixing with the patients for some days.

Case 2.—On the same day (April 23rd) Orderly P., who had been on night duty in the same ward as Trooper H., developed scarlet fever. He had sore throat on April 21st, the rash appearing on the 23rd. These patients were at once isolated, and their bedding, &c., disinfected. The orderlies who were sleeping in the same tent as Orderly P. were removed to a different tent, and were kept under observation for a week. None of them developed scarlet fever. A careful inspection of the other patients in the hospital was made, and two other men, Serg. S. and Trooper B., were found to be desquamating, and were at once isolated.

Case 3.—Serg. S. was admitted into the Field Hospital at Norval's Pont for dysentery about the middle of March. He remained there for a week, and was then transferred to Naauwpoort Hospital. At the end of another week he was transferred to Deelfontein, on April 7th. A few days before admission he had complained of sore throat, and on admission he was suffering from dysentery and tonsillitis (suppurative). No symptoms of scarlet fever were observed until April 24th, when he began to desquamate. He had been up and mixing with the patients for some days.

Case 4.—Trooper B was admitted into hospital at Bloemfontein for dysentery on April 11th, and was transferred to Deelfontein on April 16th. He remembers having sore throat about April 1st. On admission there were no signs of scarlet fever, but on April 25th he was found to be desquamating.

Case 5.—On May 5th Gunner B., who was in the same hut as Trooper H., Serg. S., and Trooper B., developed scarlet fever. He was at once isolated, and the hut emptied and disinfected.

Case 6.—On May 12th Pte. T., who was in a separate hut to the other cases, developed

scarlet fever. He was convalescing from rheumatism, and had been up and mixing with the other patients since April 29th. He was at once isolated and disinfection practised.

Case 7.—On the same day (May 12th) Orderly P. developed the disease. He had been on duty in an enteric hut where no cases of scarlet fever had occurred. He was at once isolated with the other patients. The five orderlies who had shared his tent were quarantined.

Cases 8, 9, and 10.—Ptes. J., S., and W., convalescent from enteric fever, were found to be desquamating, and were isolated.

Case 11.—Orderly S. was taken ill on May 20th, and was isolated on May 21st in the scarlet fever camp. He had been working in tents where no cases of scarlet fever had occurred. He had slept in a tent with two orderlies who subsequently had tonsillitis and were isolated, but exhibited no symptoms of scarlet fever. His clothing had been washed in the native camp a short distance from the hospital.

Case 12.—Orderly F. was taken with scarlet fever on May 22nd. He had slept in the same tent as Orderly P. (Case 7), who developed scarlet fever on May 12th. He was quarantined with the other occupants of the tent from May 12th–18th. During this time he attended three patients (Cases 8, 9, and 10) who were in quarantine convalescent from enteric fever and who were desquamating.

On May 25th the native camp was medically inspected. Two children were found to be desquamating after fever and sore throat, and with them was a woman who had been washing for the orderlies. The camp was put out of bounds, and the washing of clothing by native women prohibited.

Case 13.—Gunner C. admitted into hospital on May 25th convalescent from enteric fever. He was in Hut E, where there were no cases of scarlet fever, and had acted as orderly in the ward for two days. The rash appeared on June 24th.

Case 14.—On June 14th Mr. B. (Dresser) was attacked with sore throat and shivering, and two days later rash appeared.

Case 15.—On June 16th Orderly B. fell ill with scarlet fever. He was a carpenter and had been working with the natives.

Case 16.—On June 19th Orderly L. was attacked. He was orderly in Hut C, in which no cases of scarlet fever had occurred.

With the exception of Case 1, all these men appear to have contracted the disease at Deelfontein. The following cases are instances of imported scarlet fever:—

Case 17.—Trooper B. was admitted from another hospital as a case of rheumatism on July 14th. On the 18th he was discovered to be peeling. He had suffered from sore throat, fever, and rash a fortnight previously, and stated that three of the men in the same tent with him before he came to Deelfontein were desquamating.

Case 18.—Trooper K. was admitted to hospital on August 3rd as convalescent from enteric fever, and was found on examination to be desquamating.

Case 19.—Sergeant F. was admitted on August 31st as a case of rheumatism. Three days later desquamation was discovered.

Case 20.—Trooper H. was sent down from Mafeking with a history of sore throat three weeks previously, and was discovered on admission to be desquamating freely. He remembered no rash or fever in his case.

Instances might be multiplied, but the foregoing will be sufficient to show the nature of the imported cases and the difficulties which had to be met in our endeavour to stamp out the epidemic. In addition to the measures already described, further steps were rendered necessary by the occurrence of such cases. All fresh admissions were personally inspected by the senior medical officer, and carefully examined for evidence of the disease either in their history or present condition. No man was allowed to leave the emergency tent for a ward in hospital until he had passed this inspection. Cases detected at this stage were easily dealt with, and were isolated or quarantined as appeared necessary in each instance. They were seldom a cause of further spread. It may be here noted that many men were admitted with desquamation on the hands and feet, in whom there was no reason to suspect scarlatina as the cause. It was, however, deemed advisable, under the circumstances, to quarantine such cases, at any rate for a few days, with a view to further observation and examination. Those, on the other hand, who began to desquamate a few days after admission, whether with or without a suspicious history, were a source of greater danger. To eliminate such cases, routine inspections were held by the medical officers in their respective wards and tents, and it is probable that no case escaped detection for any length of time. It is to be feared, however, that in several instances the disease was communicated by such cases.

Measles.

There were three cases of Measles in the Hospital, of which only one was contracted at Deelfontein. The patient was a ward-maid, and she passed through a typical attack of the disease. Diligent inquiry failed to elicit the source of the contagion.

Influenza.

Notes of fifty-six cases of Influenza have reached this country, representing only a proportion of the cases treated. Of the full number there is no record, but it must have been considerably greater than the notes would indicate. During the latter part of the month of June, 1900, many cases developed among the staff and patients of the hospital. These were all comparatively mild, and without fatality. The chief symptoms were pyrexia of a few days' duration, frontal and ocular pain, anorexia, and general malaise. In a considerable number

tonsillitis, simple or follicular, developed, and a smaller proportion suffered from slight bronchial catarrh. A rigor ushered in the disease in a few instances, and in many the possibility of commencing enteric fever came up for discussion. Otherwise the cases were of no special interest.

Mumps.

Two cases of mumps were treated at Deelfontein. They were admitted on the same day, and had contracted the disease on board the transport. One case was complicated by double orchitis. There was no spread of infection in the hospital.

Malaria.

Malaria was a comparatively rare condition at Deelfontein. As an endemic disease it is unknown on the Karroo, and the cases admitted to hospital during the early part of its history occurred in men who had been previously resident in malarious parts of South Africa, or who had served in India or in other tropical countries. In the later stages, after the occupation of Pretoria and the advance to the north and east of that town, the cases coming down from the Front became more numerous. Many of the more severe cases came from the Komati Poort district, and not a few were contributed by the Yeomanry march through the pestilential Crocodile Valley.

In a number of cases the presence of the Plasmodium malariæ in the blood was demonstrated, but in others we failed to find it. Many of those patients, however, had already been treated by quinine before admission. The characteristic cycle was not always seen, the symptoms being frequently those of an ill-defined pyrexial attack, the diagnosis, apparently, depending to a certain extent on a history of previous malaria in India or elsewhere. The presence of herpes labialis in several instances is noted in the case-records. The following is an illustrative case:—

Trooper D. was admitted on June 28th, 1900. He had been ill on and off since the previous April with malaria, contracted in Rhodesia, and was in a weak and anæmic condition. On July 2nd he had a sharp malarial rigor, the attack lasting in all ten hours and accompanied by slight delirium. The plasmodium was found in the blood—large pigmented forms and a rosette. On July 5th he had another slighter attack, and by July 10th he was able to be transferred to the Base. Treatment: Quinine sulphate in 5 gr. doses.

The coexistence of malaria and enteric fever has already been alluded to (page 10).

IMPERIAL YEOMANRY HOSPITALS.

Malta Fever.

In May, 1900, a visit was paid by Dr. Washbourn to Kimberley, in order to see certain patients who were suffering from an obscure disorder termed, locally, Kimberley fever. From an examination of the cases, inspection of a number of temperature charts, and consultations with medical officers and local practitioners, the opinion was formed that the disease was really the better-known Mediterranean or Malta fever. At this period cultures of the micrococcus melitensis were not available, and a diagnosis on bacteriological grounds therefore impossible. Later, a blood examination, in several cases presenting similar symptoms, showed complete agglutination reaction in proper dilution. Several cases of this nature were seen at Deelfontein, but in only one was there microscopic demonstration of the true nature of the disease during the patient's stay in S. Africa. The following is a brief summary of the most important features:—

A civil medical officer was admitted into the Yeomanry Hospital, Deelfontein, on May 14th, 1900, with malaise and pyrexia.

History.—He had suffered from enteric fever twenty-two years earlier. He had not been inoculated. He arrived in Cape Town on March 1st, was there a few days, and had since been at Deelfontein. He had never been abroad before. Since his arrival in South Africa he had enjoyed fairly good health, but had had several acute attacks of diarrhœa, and had frequently been troubled with loose motions.

Symptoms. — The principal symptom during his stay in hospital was irregular pyrexia, lasting between four and five weeks, the temperature being frequently normal in the morning and varying between 99·4° and 102° in the evening. At the end of ten days the temperature came down, and remained normal for a few days, but it again rose, and on one occasion it was as high as 103° in the morning. There were never any physical signs; the spleen was not enlarged, the abdomen not distended, there were no spots, and the joints were not affected. The bowels were irregular, sometimes requiring an aperient; the tongue for the most part was clean, but was for a short time thickly coated. Towards the latter part of the pyrexial period the patient lost flesh and became anæmic. Convalescence was slow, and he did not recover his usual health before the end of July.

Treatment.—He was treated with quinine, salol, and tonics without appreciable results.

Examination of the Blood.—His blood was examined on two occasions, once about the middle and once towards the end of the pyrexial stage. Malaria parasites were not found, and the blood did not agglutinate the typhoid bacillus in dilution of 1 to 20. In the early part of December, four months after complete recovery, Dr. Dodgson examined the blood, and found that it agglutinated the Malta fever coccus in dilution of 1 to 40.

Another somewhat similar case occurred in a medical officer of the Pretoria Hospital, and is referred to elsewhere (p. 203).

In both these cases the initial diagnosis was enteric fever; but the subsequent progress, combined with the failure of their blood to agglutinate the bacillus typhosus finally negatived this view. In both, towards the end of the

pyrexial period, the question of general tuberculosis was raised. The complete recovery which ensued was, however, sufficient to put tuberculosis out of court. The blood in both cases agglutinated the Malta fever coccus. How far this test is reliable is still doubtful, and therefore its value is somewhat uncertain. Recovery of the organism from the spleen pulp—the only absolute criterion—was not considered advisable during the life of the patients, and there were no fatal cases.

The following case, occurring in an old Deelfontein patient, is not without interest:—

A Staff Officer was admitted in the early part of 1900 for gunshot wound. Shortly after his return to duty he contracted at Kimberley a febrile disease, which was considered to be enteric fever, and for the effects of which he was ultimately invalided home. When seen by one of us in this country he presented a much more characteristic clinical picture of febris undulans than either of the cases quoted. He suffered for many months from recurring attacks of fever, alternating with apyrexial intervals of about the same duration. These attacks lasted generally about a fortnight, and were accompanied by general malaise and loss of weight and strength. During the intervals the liver and spleen were persistently enlarged, but this enlargement always increased during the pyrexial attack, to be followed by partial subsidence during the intervals. He had joint pains, and neuralgias in various regions were a prominent symptom during the attacks of fever. Blood examinations were carried out on several occasions. It gave no reaction with the bacillus typhosus, but agglutinated the coccus of Malta fever. There were other ætiological considerations in this case, but the diagnosis of Malta fever seems to have been established on satisfactory grounds.

Simple Continued Fever.

One of the most frequently recurring terms in the sick-returns of the campaign has been that of S.C.F., or Simple Continued Fever. The phrase retains a place in the official nomenclature as signifying a clinical entity, but is one which does not commend itself to the civil medical officer. Regarded as a provisional or working hypothesis rather than a finished diagnosis, the term is a convenient one; and, although inappropriate, perhaps, in the wards of a base hospital, its use at the front has certainly much to recommend it. Under these circumstances, S.C.F. is really the equivalent of the less pretentious N.Y.D., or 'not yet diagnosed' of the official terminology.

By far the greater proportion of the patients reaching Deelfontein with a provisional diagnosis of simple continued fever proved to be cases of enteric fever. In many the attack was mild, but in by no means all. A small number appeared to have been instances of influenza, a few malaria, a few possibly Malta fever, and at least one eventually turned out to have been suffering from scarlet fever. It must also be remembered that there probably are several specific

fevers in South Africa which have not yet been recognised. At any rate one frequently meets with cases of fever which cannot be relegated to any definite disease. Some of these are cases of moderate pyrexia, lasting a few days, the only symptoms being those of malaise. Possibly these cases are abortive attacks of enteric, or some other specific fever; but there is no evidence to show whether this be so or not.

While due allowance is made, however, for all these possibilities, there still remains a small number of cases for which Simple Continued Fever would appear to be the best designation. Prolonged marching, nervous over-strain, and the general debilitating influences incident to active service, appear in certain cases to induce a tendency to slight elevation of temperature without other pathological effect. At all events, in a few cases, careful and repeated examination failed to reveal any other circumstance which could be regarded as a causal factor.

The following analysis by Dr. F. D. Boyd, of thirty-eight cases of S.C.F. admitted into the Edinburgh hospital, is interesting in this connection. In twenty-eight a diagnosis was made. Seven were undoubtedly enteric fever, four 'may have been abortive enteric,' six were regarded as malaria, and two as Malta fever. Two were cases of catarrhal dysentery, one was a surgical case; while debility from over-marching, convalescent pneumonia, rheumatism, gastro-intestinal catarrh, salivation by mercury, and incipient phthisis, accounted each for one case. The ten cases in which no definite diagnosis could be arrived at were, Dr. Boyd thinks, probably convalescent from influenza.*

Diseases of the Alimentary System.

Diseases of the Alimentary System formed a large proportion of the work of the Medical Division.

Defective Teeth.—This was a very frequent cause of invaliding. It is commonly stated by residents in the country that teeth 'do not last well' in South Africa, but the men of the Field Force suffered much more severely than the ordinary civilian in peace time. To the nature of the food the condition was in great measure due. The mechanical action of the hard ration biscuit in breaking weak or carious teeth was probably the chief cause. A mild scorbutic condition was detected in some cases, and in all the difficulty or impossibility of attending to the hygiene of the mouth was no doubt an important factor. Many officers came to the hospital with fractured plates or other artificial dentures, caused through the mastication of biscuit. In a number of these cases the services of the dental surgeon were sufficient to render the men fit for duty.

* *Report of the Edinburgh and East of Scotland Hospital*, p. 157.

Stomatitis was not infrequent. In a certain number it was an expression of a general scorbutic condition, in others dental caries, and the septic condition of the mouth induced by neglect seemed to account for the inflammation. The general health in nearly all was much reduced. Attention to the teeth, antiseptic mouth washes, together with proper diet and digestive tonics rapidly affected a cure in the great majority.

Tonsillitis.—Apart from the throat inflammations associated with other diseases, seventy-one cases were admitted for tonsillitis, and many more were treated as out-patients. At least seven of the admissions went on to suppuration; the others were examples of ordinary follicular inflammation of varying severity. In a few cases diphtheria was suspected, but bacteriological examination failed to demonstrate the presence of Loeffler's bacillus.

Gastritis, Dyspepsia, or Indigestion appeared with great frequency on the nominal roll of patients sent down to hospital. Unsuitable food, defective teeth, and the accompanying oral sepsis were the commonest causes, and a more or less complete break-down in general health a frequent result. Under rest and diet improvement took place, but unless the dental defects could be corrected and a suitable dietary ensured relapse was almost certain to take place when the man went back to ordinary duty. Consequently the cases were, as a rule, sent to the base for disposal.

Diarrhœa was the commonest affection in the Army in South Africa. The Hospital Staff all, or nearly all, suffered on first arriving in the country, and this apparently without very direct reference to the season of the year. The experience of all fresh arrivals from home was the same, and during their first few weeks' work, frequent absence from duty resulted from this affection. Afterwards a certain tolerance appeared in the majority to be established, but many individuals suffered to a greater or less extent during the whole of their stay in the country.

Medical officers serving in the field report a similar condition among both men and officers. The causes of this condition have been variously stated. Unsuitable diet, bad water, the mechanical irritation of dust and sand in the food, and microbic infection have all to be considered. Exposure to wet and cold, and the extreme and rapid diurnal variations in temperature are no doubt also important causal factors. The symptoms varied considerably in severity. In many the diarrhœa, though sharp, and accompanied by mild pyrexia and slight abdominal discomfort, lasted but a few days, and was followed by rapid convalescence. In others, the condition was more prolonged, the abdominal pain severe, and the calls to stool frequent. The passage of blood and mucus with tenesmus was common in the more aggravated cases. Vomiting in the early stages was not

unusual. There were no fatalities from uncomplicated diarrhœa, and, therefore, there is no available account of the exact morbid anatomy. In the milder forms a catarrhal inflammation of the large bowel, and in the more severe follicular ulceration seem the most likely conditions. Where simple diarrhœa ends and dysentery begins is, as pointed out by Dr. Tooth,* difficult to determine. Many cases diagnosed as acute diarrhœa would be equally well described as mild dysentery. The difference is apparently one of degree only.

The treatment consisted of rest in bed if possible, mild starvation, an initial dose of castor oil and laudanum, followed by an alkaline bismuth mixture and astringents. Salol or other intestinal antiseptics answered well in some cases in the later stages. The acid opium mixture we did not find of much value. On the whole, perhaps, Bismuth carbonate combined with Pulv. Ipecac. Co. was the most generally useful remedy.

Constipation, either following upon an attack of diarrhœa or arising *de novo* had frequently to be treated. The former was a troublesome condition, and was again followed in many cases by diarrhœa. The lattter was less frequent and occasionally simulated an attack of mild dysentery. The following is an illustrative case :—

A Medical Officer was admitted to hospital on March 10th, 1901, complaining of diarrhœa, from which he had been suffering for eight days. The bowels had been opened six or seven times daily, the motions small, and consisting chiefly of blood and mucus. There was slight abdominal pain and very little tenesmus. The tongue was furred and the breath foul. On examination there was tenderness over the umbilical and hypogastric regions only, and scybala were readily detected in the transverse and descending colon. The treatment consisted of enemata for two days, followed by a daily aperient. A large quantity of scybalous masses was evacuated, together with mucus in small amounts, and in ten days the patient was discharged to duty.

In another case a subaltern was sent to the hospital with a diagnosis of dysentery. Abdominal palpitation revealed a similar condition to that described, and daily aperients rapidly effected a cure.

Jaundice.—Epidemic jaundice described as occurring in other hospitals was not seen at Deelfontein. We have notes of only sixteen cases of jaundice, though doubtless there were a greater number treated. Three of the cases were associated with cholelithiasis, the others were regarded as belonging to the catarrhal variety. They all recovered, and in none were operative measures considered advisable.

Appendicitis.—Two cases of appendicitis have already been referred to in connection with enteric fever (page 9). Excluding the cases transferred to the Surgical Division for operation, we have notes of only three cases treated in the medical wards. The condition was by no means frequent, but there were other

* *A Civilian War Hospital* (Portland Hospital Report), page 88.

cases of which the notes have gone astray. The following case may be shortly summarised:—

An Officer in the R.A.M.C. was sent into hospital from a column operating in the neighbourhood, on the evening of March 6th, 1901, certified as suffering from enteric fever. His illness began on February 28th with abdominal pain and headache. For three days he continued on duty, the pain steadily increasing, but on the fourth had to take to bed. The bowels had acted daily till March 3rd, on which day, after a mild aperient, there were four actions. Since then there had been constipation. On admission the temperature was 101·2°. The tongue was furred, and the abdomen a little full, with marked resistance and tenderness over the right side. There were a few very doubtful 'spots,' but no splenic enlargement was detected. Next day there was less pain, and the tenderness was limited to the cæcal region. The distention disappeared rapidly, and in a few days a mass could be made out in the right iliac fossa. The treatment consisted of liquid diet, small doses of opium internally, and belladonna fomentations to the abdomen, followed, after the acute symptoms had subsided, by enemata. Patient was discharged to light duty on March 24th.

Tape-worm was seen in a single case. The patient, an Imperial Yeoman, had shown symptoms for nearly a year, and had been treated by various anthelmintics without success. After a dose of Filix Mas a complete tape-worm 24 feet long was passed, and proved to be an example of T. saginata.

Malignant disease of the abdomen, as might be expected in a hospital, the great majority of whose patients were young adults, was seen but rarely. There are notes of three cases.

Case 1.—A young soldier of the 6th Lancs. Fusiliers died of multiple sarcomatous growths, originating in the peritoneum of the small intestine. There were large masses of growth in the mesentery, and the lymphatic glands in the right axilla, right supraclavicular fossa, and in the anterior and posterior mediastinum, were affected. Smaller nodules were found in the right lung.

Case 2.—An Officer in the Imperial Yeomanry was invalided home with (probably) carcinoma of the pylorus.

Case 3.—In this case a malignant neoplasm was discovered in the cæcal region. The liver was enlarged, and in all probability the seat of secondary growths.

Diseases of the Circulatory System.

Valvular Diseases of the Heart (V. D. H.)—Valvular disease was seen in a considerable number of cases. It was found to be extremely difficult or even impossible in some instances to differentiate between valvular lesions acquired in South Africa and old standing heart affections with failure of compensation. In many cases, however, the history was a sufficient guide, as in the following examples:—

Case 1.—Trooper B., of the Imperial Yeomanry, was admitted to hospital on August 26th, 1900, with a diagnosis of V.D.H. He had had an illness of a month's duration in June of the same year, considered to be enteric fever, in the course of which he had suffered from joint pains.

Three years previously he had passed through an attack of rheumatic fever, at the conclusion of which he was told that his heart was unaffected. In December 1899 he was examined for the Yeomanry force and pronounced sound. On admission he was found to be suffering from aortic and mitral regurgitation.

Case 2.—Trooper M., of the Imperial Yeomanry, was admitted on September 16th, 1900, convalescent from an attack of rheumatism a month previously. He had suffered from acute rheumatism eighteen months earlier, and was informed by his medical attendant that his heart was affected by the illness. On examination a diastolic murmur was heard in the aortic area, extending down the left border of the sternum, as well as presystolic and systolic murmurs at the apex.

In a large number of the cases, perhaps the majority, there was a history of rheumatism, recent or more remote, but in a certain number there was no evidence of any rheumatic affection. Many of the latter appeared to be instances of disease with insidious onset, which had caused no symptoms until compensation broke down under the prolonged strain of active service. It is probably well within the mark to say that the great majority of our cases were examples of old standing disease. In only exceptional cases was a definite diagnosis of recently acquired valvulitis possible.

Disordered Action of the Heart (*D. A. H.*) — Cardiac dilatation with the resulting general cardiac insufficiency brought more men to hospital than true valvular disease. General debility, precordial pain, with dyspnœa and palpitation on exertion were the symptoms most frequently complained of, and in a few instances syncopal attacks, vomiting, and even hæmoptysis were noted. The physical signs varied somewhat. A feeble diffuse apex beat, some extension of the lateral cardiac dulness, and irregular or intermittent action were nearly always present, and in many cases a murmur indicative of mitral regurgitation was added. In a certain number the right side of the heart was most affected, dilatation of the right ventricle and a tricuspid regurgitant bruit being noted on physical examination. The condition occurred most frequently in weedy, undersized lads, for whom the strain of prolonged marching and heavy fatigues proved too severe. Next in order we should place the reservist, more mature in years and bodily development, but softened by a period of civil employment. The soldier of a few years' standing—the 'three-year-old' of a well-known expert—by reason of his more constant physical training, lasted better, and in the Colonial-bred trooper, accustomed to a hard life in the open, and to the trying effects of prolonged exertion in sub-tropical temperatures, the condition perhaps least often occurred.

In many cases a definite diagnosis was far from easy. A typical case such as that quoted below presented few difficulties. Others were undoubtedly instances of broken compensation in an already damaged heart. In a few the subjective

sensations could not be corroborated by physical signs, and it is a debatable point whether the 'heart failure' had not more of a psychological than a physical basis. The following may be taken as an illustrative case of genuine D.A.H.:—

Pte. R. was admitted on March 20th, 1900. He had been suffering from general debility, with dyspnœa and palpitation on exertion, giddiness and faintness, and had reported sick on February 14th, as he 'was unable to keep up with the regiment.' There was no history of rheumatism in any form, the only previous illness being malaria while serving in India. The chief complaint on admission was weakness, 'sinking,' and precordial pain. On examination, the apex beat was diffuse and indefinite; the left border of the heart reached to the nipple-line; the sounds were short and valvular; no murmur was detected, but there was a very distinct embryocardiac rhythm. The pulse was 'very small and compressible': 104 per minute with the patient lying down, increasing to 110 in the upright position. Beyond slight emphysema, there were no other signs of disease. Under complete rest and small doses of digitalis the conditions quickly improved. The apex beat became more definite and more normal in position, the sounds firmer, and the pulse slower. Patient was discharged to the base on April 9th.

Aneurysm.—Thoracic aneurysm occurred in two or three instances. The following is the only case in which post-mortem evidence was obtained:—

Pte. S., æt. 28, 1st Gordon Highlanders, was admitted on March 26th, 1900, complaining of cough and burning pain in the chest. There was distinct orthopnœa, and tracheal stridor developed soon after admission. The heart's action was rapid and forcible, but no murmur was audible. The lungs were emphysematous, the air entry was equal on the two sides, and a few sibilant rhonchi the only abnormal sounds. Laryngological examination showed no evidence of obstruction or pressure. The pupils and pulses were equal. There was a specific history. The patient was examined by several medical officers, and, although aneurysm was suspected by all, no definite physical signs were demonstrated. His condition steadily deteriorated. Attacks of alarming dyspnœa occurred; the breathing became more difficult and the cough harder, and on April 8th pain and tenderness in the region of the upper dorsal spine was complained of. On this date the patient was placed on potassium iodide in 7 gr. doses, increased in a few days to 10 grs., and later to 20 grs. three times a day. A radiograph taken on April 13th proved negative. A note made on April 19th states that the 'general condition has been improving lately,' but deficient air entry on the left side was noted, and a pleuritic rub at the left posterior base was detected next day. Improvement from this time was continuous. On April 4th the notes state that the cough, dyspnœa, and pain had disappeared, the patient was beginning to put on flesh, and was allowed to sit up for part of the day. Next morning death occurred suddenly when patient was leaning out of bed in order to see out of the ward window. Post-mortem, an aneurysm involving the second and third parts of the aorta was discovered. It was adherent to and had eroded the third, fourth, and fifth dorsal vertebræ, and caused pressure on the trachea and left bronchus. Death was due to rupture into the œsophagus.

Diseases of the Respiratory System.

Respiratory diseases were in our experience comparatively rare. They formed only 0·44 per cent. of the total number of cases treated as in-patients. One has

been accustomed to associate pulmonary diseases in an especial manner with exposure to cold and wet and adverse climatic conditions generally. Of this factor there was no lack in the campaign, but respiratory affections were conspicuously absent from the medical wards. By the time that the hospital was established at Deelfontein, the men of the Field Force had no doubt become inured in some measure to hardship. But this does not apply to new-comers. Many of the regiments that followed us to S. Africa took their place in the fighting line at once, and without any preliminary hardening. The men were exposed to all weathers. They slept nightly on the veldt with no covering but a blanket and overcoat and no protection from the ground but that afforded by a waterproof sheet, and that too during the winter months when the night temperature is considerably under the freezing point. It would appear therefore that exposure *per se* has not the important causal relation to respiratory disease that is generally imagined.

Tuberculosis.—Twelve cases of tuberculosis of all kinds were treated in the hospital. Of these the greater number were examples of pulmonary disease. How many of these patients contracted the disease in South Africa cannot now be stated, but there was reason to believe that in some of the cases the condition was of old standing.

In one case miliary tubercnlosis of the lungs occurred as part of a general infection. The patient, an Imperial Yeoman of 21, was admitted on March 20th, 1900, on the tenth day of an illness of obscure nature. He had had no previous illness with the exception of an attack of peritonitis, probably appendicular in origin, ten years previously. There was no family history of tuberculous disease. For some days there were no further developments. The patient complained of headache; his temperature oscillated between 99° and 103°, and a trace of albumin was found in the urine. By April 5th the headache had considerably increased; photophobia developed, and ophthalmoscopic examination showed commencing double optic neuritis. Nausea was complained of, but there was no vomiting till a week later. At this time, though the temperature remained high, the pulse was abnormally slow. In a fortnight's time the patient lapsed into a subconscious condition. Weakness of the right side of the face ensued together with rigidity of the arms and retraction of the head, and death took place on April 25th. *Post-mortem.*—The lungs were seen to be studded with miliary tubercles, and an old apparently healed tubercnlous lesion was found at the right apex. The spleen was affected, and there was marked tuberculous basal meningitis. The abdominal viscera showed no evidence of infection.

Pneumonia.—Forty-six cases of pneumonia are stated to have been admitted to hospital. Of these over fifty per cent. had passed through their acute stage elsewhere and arrived at Deelfontein convalescent. There are notes of ten cases under observation during the whole or greater part of the illness. Of these four died. Two of the hospital orderlies also died of acute lobar pneumonia. Another case was complicated by empyema. The patient was transferred to the surgical division, and recovered after operation.

Pleurisy.—The case-records show twenty-two cases of primary pleurisy. In three only of these was there effusion to any extent. The following case may be quoted, as it does not appear among the cases of enteric fever, owing to the notes being unavailable at the time when those statistics were compiled.

Pte. A., æt. 24, Grenadier Guards, was admitted on April 15th, 1900, with a diagnosis of left-sided pleurisy, his illness having begun on April 2nd. A previous attack of pleurisy had occurred on board the transport on the way out from England in February, and had lasted two weeks. The present attack was attributed to wet. The patient's father and one sister had died of phthisis. On admission the temperature was subnormal. The left chest was tender to percussion, and a well-marked friction rub was audible over the lower half, back and front. On the right side the breath sounds were feeble, but no further abnormality was detected. There was a good deal of cough, with free expectoration of thick greenish sputa. The case was regarded as probably tuberculous in origin. The friction rapidly lessened, and râles appeared at the left base.

On the fifth day after admission the temperature began to rise, the spleen enlarged, and the abdomen gradually became distended. On May 2nd typical enteric spots were noted. Two days later a patch of pneumonia was detected in the left lung, followed on May 9th by consolidation on the right side. The voice became hoarse and bright blood was expectorated, apparently from the larynx. The condition steadily became worse, and death ensued on May 9th.

Post-mortem.—Typical typhoid ulceration of the ileum was found, together with signs of pleurisy on the left side, consolidation in both lungs, and ulceration of the larynx.

Bronchitis.—Forty-five cases of bronchitis passed through the hospital. In nearly all the attack was mild, and after a fortnight's treatment the patients were discharged to duty. In four cases the condition was of old standing and complicated by emphysema, and in four the possibility of tubercle was entertained, but there does not appear to have been any bacteriological examination of the sputum in these cases.

Spasmodic Asthma occurred in a single case. The patient, a man of thirty-two, had been subject to similar attacks for three years, and the condition had been aggravated by his stay in South Africa.

Hydatid of the Lung was diagnosed in one case:—

A Trooper in the N.S.W. Lancers was admitted on April 26th, 1900, with a three weeks' history of cough. Nothing abnormal was discovered in his chest beyond slight impairment of resonance and a few coarse râles at the right scapular angle. Next day he coughed up a few small cysts about the size of horse-beans and 'obviously hydatid in nature.' A fortnight previously he had noticed in his expectoration, on one occasion only, several similar but much smaller bodies. Examination by the X-rays showed posteriorly 'a distinct rounded, defined patch of opacity in the eighth interspace, about one inch from the spine, the size of a shilling.' This could not be seen from the front. On May 7th another smaller cyst was coughed up, and another on June 2nd. On May 23rd another X-ray examination was made. The opacity was not so well seen from the back, and seemed further from the spine than before. A distinct shadow could however be made out from the front. Patient was discharged to the base on June 6th.

The exact pathology of the following case is a little obscure, but pulmonary embolism would perhaps best explain the symptoms and physical signs:—

Pte. B., R.A.M.C., was admitted to hospital on April 15th, 1900. He had 'gone sick' on March 31st, the chief symptom being throbbing in the head and giddiness. Two days later he had pain in the right side, and three days thereafter pain and swelling in the right leg and thigh set in. The temperature had been continuously raised (101°–104°) until two days before admission. He had at first no cough, but for some days had been coughing a good deal, and for twenty-four hours before admission had been 'spitting blood.' On admission he complained of no pain whatever. The right foot and leg were œdematous; the popliteal vein and its branches in the calf could be felt firm and cordlike, and there was indefinite thickening along the femoral vein. Over the right lung posteriorly there was impaired resonance from the spine of the scapula, and almost absolute dulness from the angle downwards. The breath sounds were very feeble, with sharp crackling râles at the base. V.R. and V.F. were slightly diminished. The sputum contained blood clot and is noted as 'a little offensive.' The left lung and the heart showed no signs of disease. The temperature was 101°, the pulse 84, and the respirations 18 per minute. For the first few days the dulness at the right base increased, the breath sounds became more feeble, and the V.R. and V.F. still more diminished. A small patch of distant tubular breathing with râles was noted on May 23rd, and friction sounds could be made out at the upper limit of the dull area. The sputum contained blood till April 22nd, and the temperature continued raised till April 24th, the pyrexia being of septic type with marked morning remissions. Sweating is noted as a prominent symptom. After the fall of the temperature the physical signs gradually cleared up. The tubular breathing disappeared first, the friction was audible for a week longer, and the impairment of resonance, together with the diminished voice and breath sounds, though much improved, were still noted on May 10th.

Whether the phlebitis and the pulmonary lesion are in this case to be considered in the relation of cause and effect, or whether both were due to a common cause, is now difficult to determine. The pain and œdema in the leg are stated to have occurred later than the pain in the side, but it may be that early signs of commencing femoral thrombosis were not noticed by the patient. At the time the case was certainly considered to be one of pulmonary embolism, and possibly there were reasons for this diagnosis which have not been set forth in the case-record. The important point, however, is that there is no reason for supposing that the thrombosis was in any way due to an attack of enteric fever. There was no case at Deelfontein of embolism following on enteric thrombosis, and we are not aware of the occurrence of this accident in South Africa. This is particularly noteworthy when one considers the frequency with which pulmonary embolism has followed thrombosis of influenzal origin. It is possible that in this case influenza was the prime factor; at all events, there is nothing in the case-record which would altogether negative the supposition.

Diseases of the Nervous System.

Organic Nervous Disease was exceedingly uncommon. Instances of Hemiplegia, Insular Sclerosis, Locomotor Ataxia, General Paralysis of the Insane, Transverse Myelitis, and Peripheral Neuritis were met with.

Epilepsy occurred in a number of cases. In many the attacks were observed in hospital, but in others a history of fits was alone available. *Petit mal* was seen in three or four cases.

Neuralgias of all kinds were common. Facial neuralgia, generally associated with dental caries, was most often seen, and sciatica was by no means infrequent. The latter in many cases appeared to be due to hardship and exposure, but in a few cases followed acute illness as enteric fever or dysentery.

Insolation, Sunstroke, Effects of Sun, Headache from Exposure to Sun, and the like were diagnosed in a great many cases before they reached Deelfontein. The chief complaint was headache, especially on exertion, and general lassitude and debility. In the heat of the day these symptoms were distinctly increased, and the patients showed, in many instances, great reluctance to leave their ward except in the cool of early morning and evening. It is doubtful how far these symptoms should be ascribed to 'effects of sun.' In a certain number of cases malingering was more than suspected. The following was the only example of a case of this nature which came before us in the acute stage:—

A Dresser while shooting under a hot sun lost his hat. He continued on the veldt for about an hour, when he was seized with acute pain in the head and cervical spine, and had to return to camp. Next day the pain continued, and extended to the dorsal region, down the arms, and round the lateral aspect of the body. It was increased on movement. The patient was frequently sick, and thinks he was 'feverish' at first, but there is no temperature record. By the following day the symptoms had diminished in severity. Sickness had ceased, and the temperature was very slightly raised. He was admitted to hospital, and gradually recovered under rest and light diet. Discharged in five days, and able for duty in a week.

Another case may be quoted as illustrative of the condition more frequently seen at Deelfontein.

A Subaltern of Imperial Yeomanry was admitted on Feb. 17th, 1901. The first symptoms, headache and vomiting, had occurred on his reaching camp after a long trek in the hot sun, twelve days before admission. Next day the pain was worse, and was accompanied by giddiness, from which cause patient fell from his horse on parade. There was probably no loss of consciousness. Two days later he rode for some hours, but again was unable to keep the saddle from the same cause. The temperature was taken on one occasion only, but the result was not told him. On admission he was free from pain, but movement, stooping, or going out in the hot sun at once induced headache, especially in the right temporo-frontal region. The tongue was furred and the bowels constipated, the abdomen natural, and the liver and spleen of normal size. The thoracic viscera showed no signs of disease. There was no pyrexia, and there had been no sickness for two

days. The pupils acted to light and accommodation, the ocular movements were perfect, and there was no muscular weakness or sensory change to be detected anywhere. The condition improved slowly, but when discharged to the base on March 17th the patient still complained of headache and giddiness, the latter especially on stooping down.

Functional Nervous Affections occurred in a few cases. Hysterical aphonia was met with three times. Neurasthenia of varying grade was commoner. It appeared to be due to the physical exhaustion following forced marches and insufficient and improper food, and to prolonged mental strain. In one case there was a history of a previous similar attack.

Diseases of the Urinary System.

There were, in all, fifty-four cases of genito-urinary affection, but the notes of a small proportion of that number are alone available. The majority were treated in other hospitals, and arrived at Deelfontein convalescent.

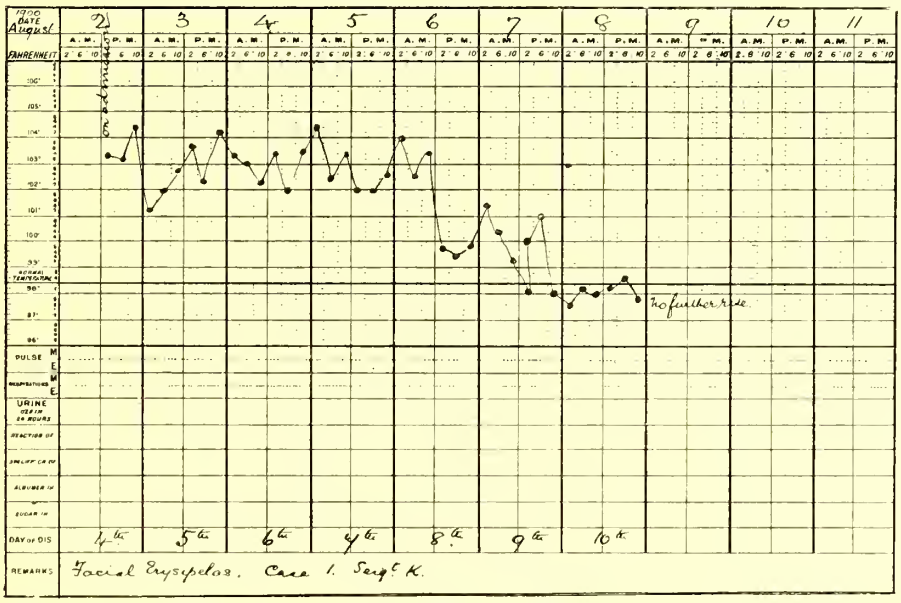
Acute nephritis was singularly infrequent. If exposure to cold and wet may be regarded as a causal factor in the production of the disease one might have expected many cases of renal inflammation in the Medical Wards. The reverse was the case. We have records of only six cases of acute Bright's disease in whom the disease had been contracted in South Africa. Old standing nephritis was more common, and in many of these cases an acute attack was superadded to the chronic affection. For severe hæmaturia seven patients were admitted. Of these two were due to traumatism, three were cases of renal calculus, and in two the ova of Bilharzia hæmatobium were found on microscopic examination. Renal calculus was diagnosed in several other cases, the chief symptoms being pain, and with the occasional passage of blood in the urine. In one case, a Yeoman arrived in hospital with an imperfectly healed nephrotomy wound. Judging from the cases seen at Deelfontein the medical examination of recruits for this force would appear to have been conducted, in respect of renal and cardiac disease, on particularly liberal lines.

Diseases of the Skin.

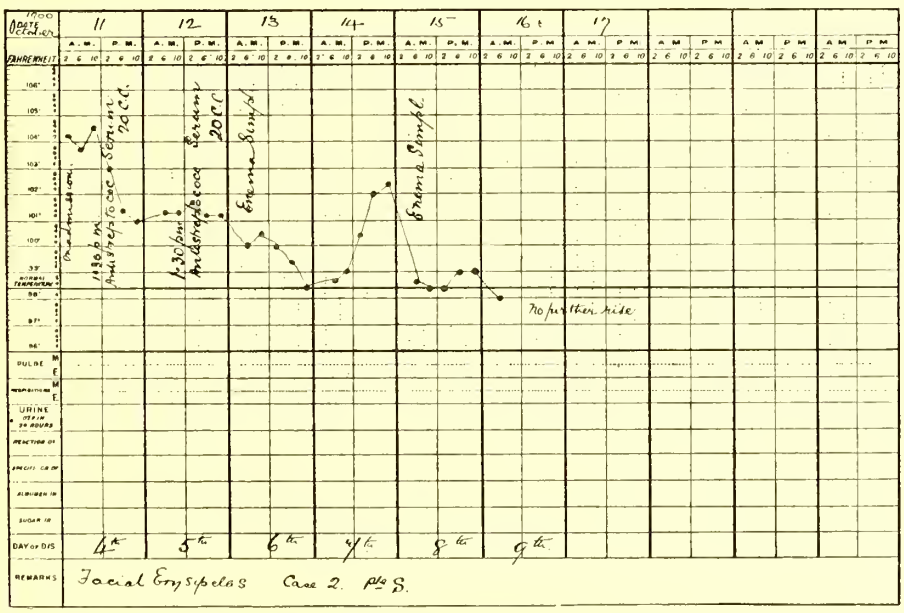
Skin disease in the Medical Wards was not common. Pediculosis, however, in the early months of the Hospital's history, was a very frequent and a very troublesome condition, but later it became comparatively rare. Veldt sores and furunculi—a common condition—were transferred to the surgeons. Eczema, acne, and psoriasis came more frequently under the physician than any other skin affections.

Erysipelas was less often seen than might have been expected. The following charts are interesting:—

Case 1.—Sergt. K. was admitted August 2nd, 1900, on the fourth day of disease. The case was evidently a mild one, the inflammation being confined to the nose and right side of the face.



The notes state that on patient's admission redness and swelling were 'visible.' Under expectant treatment the temperature became normal on the sixth day of stay in hospital.



Case 2.—This was a severe case of facial erysipelas. The patient (Pte. S.) was admitted on October 11th, 1900, on the third day of illness. He had previously been a patient of the hospital

for enteric fever complicated by an atta k of facial erysipelas, which had lasted, according to his own statement, 'the best part of a month.' This cannot be confirmed, as the notes have been mislaid. On admission the whole face was found to be involved, the upper limit extending beyond the hair margin and the lower to the neck. The eyelids were much swollen, and could not be separated. There was copious pustulation on both cheeks, and the left conjunctiva was chemotic. On October 11th (fourth day of disease) 20 c.c. of antistreptococcic serum were injected under the skin of the abdominal wall, and a similar dose was given next day. After the first injection there was very little extension of the disease, and that only in one direction; and by October 13th (sixth day of disease) the temperature had become normal. A rise to 102·2° occurred next day, but was probably due to the want of an aperient.

A case of cellulo-cutaneous erysipelas proved fatal from pyæmia after a prolonged illness.

Rheumatism.

Acute Rheumatism may, for convenience, be considered here. This was an unexpectedly rare condition. The case-records of twenty-one cases are available for analysis. These were all admitted for acute rheumatism, or its immediate effects, and we have excluded from the list those admitted for cardiac disease consequent upon the attack. These have been considered separately, under valvular disease of the heart.

Of the twenty-one cases, ten were admitted convalescent, and showed no signs of joint implication during their stay in hospital. Three had suffered from a previous attack of acute rheumatism, in three there had been no previous attack, and in four there is no positive statement as to whether there had or had not been a similar illness previously. In two there was definite evidence of valvular disease, in one there was a murmur on admission, which afterwards disappeared; and in seven the heart was sound. As to the real nature of their illness, the evidence for acute rheumatism may be described as 'good' in five, 'fair' in three, and 'doubtful' in two. This evidence, it should be stated, was obtained from the account given by the men themselves, as several brought no transfer-papers with them. They were all suffering from anæmia and debility, consequent on their illness, and all rapidly improved under treatment.

Of the other eleven cases who showed definite signs of acute rheumatism at Deelfontein, six had gone through a previous attack or attacks, in two there had been none, and in three there is no definite statement. In three cases the heart escaped, in two a transient murmur developed, and in six there was evidence of cardiac inflammation. Three of these were instances of pericarditis, and in two the patients were admitted with physical signs. The others were examples of valvulitis, and in only one did the murmurs develop in the hospital. There was no death from acute rheumatism at Deelfontein.

It will be noted that in at least nine of the twenty-one cases, or 42·8 per cent., there is positive evidence of a previous attack, and in others there may have been. It would, therefore, appear a good working rule, that in the selection of men for active service a history of an attack of rheumatic fever in any individual should be sufficient to exclude him from the ranks. The risk of a second attack is extremely great, and the risk of a minor or subacute attack still greater. In either case the man is hopelessly crippled so far as his usefulness in the field is concerned.

Rheumatism.—Apart from true acute rheumatism, rheumatic affections of all kinds were extremely common. In all 436 cases passed through the hospital.

Two chief varieties may be distinguished:—

(1) Articular. Sub-acute or chronic.

(2) Muscular and fascial.

The former occurred in a large number of cases. The joints most frequently affected were the knees, shoulders, elbows, and spine, but others were not infrequently involved as well. From many of the patients a history of previous acute rheumatism was obtained, and in several a tendency to rheumatic pains on and off since the acute attack was specially noted. The joints were frequently reddened, swollen and tender, with effusion into the capsule. Pyrexia of mild type, lasting in many cases for a few days only, was generally present, but sweating was uncommon. The affection appeared to be truly rheumatic, and the symptoms rapidly disappeared under salicylate of sodium.

The case-records show several cases admitted with all the above symptoms who developed in a few days characteristic signs of enteric fever.

A more chronic variety was also seen in which there was less evidence of joint inflammation and in which the salicylates were less beneficial. Counter-irritation, massage, the steam bath, liberal diet, and tonics were the most successful measures, but the cure was always tedious and frequently incomplete.

Fascial and Muscular Rheumatism was a very common affection. The lumbar muscles with their aponeurotic expansion over the sacrum and the tendinous insertion of the inner hamstrings in the neighbourhood of the knee were the most common sites of the pain. The joints themselves were seldom affected, but they did not escape in every instance.

The exact nature of the affection is not clear. The patient comparatively seldom gave a history of previous rheumatism, and salicylates were not of much service in treatment. Exposure to cold and wet seemed in the majority of cases to be in direct causal relation to the onset of the symptoms, and in a few traumatism, ricks, sprains, and the like appeared to be the starting point. The severity of the symptoms were probably over-estimated, or at least, over-stated, by the

patient in certain instances, and in these, confinement to bed, 'plain milk' diet, and repeated blistering, were found to be the best line of treatment.

In all of the cases considered under the preceeding sections, as well as in those of acute rheumatism, the proper disposal of the patients after leaving hospital was a matter of extreme difficulty. Experience showed that the men were quite unfitted for the hardships and exposure of the trek, and relapse was almost certain to follow return to field service. Garrison duty, or orderly work in a hospital, was more suitable, but this could not always be provided, and many were ultimately invalided home. With the exception of enteric fever and dysentery, rheumatic and quasi-rheumatic affections were, we think, a more fertile source of loss to the Field Force than any other disease.

Osteo-arthritis.

Notes of three cases of osteo-arthritis are to hand. In one of these, a man of fifty years of age, the affection was generalised, the knees, hips, elbows, shoulders, wrist, and small joints of the hands and fingers being specially involved. For some time the case was considered to be one of acute rheumatism, but the distinctive characteristics of osteo-arthritis ultimately developed. The others were instances of the monarticular variety, the right hip-joint being affected in each case.

General Debility.

Apart from the effects of the various conditions already considered, many men were admitted to hospital suffering from general debility, the result of prolonged hardship, privation, and overstrain. In a certain number, beyond general bodily weakness there was little that was definite in either symptoms or physical signs; but in many, loss of flesh, anæmia, and digestive disorders were conspicuous. In all, the general nutrition was much below par, and a number showed signs of resulting functional nervous derangement. Insufficient and improper food, forced marches, the strain, physical and mental, of continual fighting, and the general wear and tear of field service, combined to bring about these results. Hospital treatment was of great value in these cases. Rest, good food, alcoholic stimulants, especially in the form of beer or stout, and tonics, effected rapid improvement, and after two or three weeks the majority were ready to return to duty.

SURGICAL NOTES

BY

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The cases with which these notes are concerned were treated in one only of the two surgical sections of the Imperial Yeomanry Hospital at Deelfontein—the section of which we were in charge during the year 1900 from March to December, and in which we were associated with Messrs. W. C. Ashdowne, F.R.C.S., and J. B. Christopherson, M.D., F.R.C.S. The notes are based on the hospital records, which were prepared by the dressers upon the same lines as those observed in a civil hospital; the cases not thus recorded being only those in which the condition of the patient on admission was such as to allow him to be at once transferred to the Convalescent Camp.

The surgical cases admitted into a base hospital may conveniently be divided into three classes. Class I. includes those admitted for bullet or shell wounds. Class II. includes the accidental injuries incidental to the conditions of active service. Class III. includes the various surgical diseases occurring independently of the conditions of active service, or only indirectly dependent upon them. The civilian surgeon, altogether inexperienced in the work of the military medical officer, is not unnaturally struck by the considerable proportion of his work which is concerned with just such cases as are found in the surgical wards of a civil hospital in times of peace.

Bullet Wounds.

It need hardly be said that in the large majority of cases the wounds were produced by the Mauser bullet. Almost without exception retained bullets, extracted by operation, were Mauser bullets, and in nearly all cases in which the nature of the bullet could only be assumed from the nature of the wounds, the evidence pointed strongly to the same conclusion. In this connection it is interesting to note how readily the soldier states the range at which he was hit, and the nature of the bullet by which he was wounded. Such evidence must be

aeeepted with a good deal of reserve, as indeed must statements with regard to expanding (the so-ealled 'explosive') bullets—statements whieh often rest merely upon the exeeptionally extensive nature of the wound, whieh results usually, if the question of range be excluded, not from its infliction by an expanding, but by a rieoehet, and thus deformed, bullet.

Having worked solely at a Base Hospital, we ean say nothing from personal observation of the immediate symptoms and characters of the Mauser bullet wounds, nor do we feel that any remarks are neeessary eoneerning the Mauser bullet in partieular, or projeetiles in general, as reports on these subjects have been not infrequent during the last two years. We are eoneerned only with the eondition of the wounded when they first eame under our eare, several days at least, and often several weeks, after the reeeipt of the wound.

One point was, however, earefully noted in every ease, viz., the sensation experieneed at the moment of the wound. It is noteworthy that the word 'pain' was very rarely used in describing the immediate sensation; such expressions as 'sharp pain,' 'stinging pain,' 'pain like a nail being driven in,' were quite exeeptional. In the large majority of eases, the immediate sensation was of a dull eharacter, as indieated by the expressions 'a heavy blow,' 'a blow with a sledge-hammer,' 'a blow with a cricket-ball' or 'heavy stick,' 'the kick of a horse,' and the like. One man who was shot in the shoulder felt as if he had been 'struck by a locomotive.' The favourite statement, however, was, 'It felt like a heavy blow, which knoeked me over.'

There was occasionally elieited one interesting fact, viz.,—that the sensation produced by the wound was referred only to the position of the exit of the bullet. Thus, a man who was shot in the chest, the bullet passing downwards through the abdomen, and out below the erest of the left ilium, only felt what he compared to 'a blow with the butt of a rifle over the left hip.'

In some eases of wounds in the limbs, the sensation was referred to the extremity of the limb. Thus, a soldier shot through the knee felt as if he had been 'banged in the sole of the foot;' and another, shot through the thigh, thought he had been shot in the foot. In more than one of these eases there was evidenee of nerve injury, and possibly it may have been present in all.

Lastly, it sometimes happened that when two parts of the body were separately wounded by one or more bullets, only one of the wounds was felt. For instanee, a soldier was shot through the thigh, and the knee being flexed, the bullet entered the calf and was extracted from beneath the skin of the front of the leg; the faet that the bullet had penetrated the thigh was not detected until the clothes were removed on the following day.

We pass now to a consideration of a series of 185 bullet wounds, oeeurring

in 167 men who came under our personal care, and of which we have complete records. Of these 185 wounds, 149 were healed, or nearly healed, when they first came under our observation; one, or both apertures, more commonly that of exit, presenting at the most a short sinus, or a small granulating surface beneath a scab, which was usually completely healed within a few days. The remarkably trivial nature of the scars in the skin is so well known as to need no further mention, whilst the deep part of the track was either imperceptible, or, at the most, could be felt as a slightly indurated cord. In many instances, although penetration of a bone must have occurred, no evidence of the bone injury existed. In wounds limited to the soft parts of a limb, even when the whole track had healed by first intention, it was often noted, after many weeks, that a good deal of stiffness in the part persisted, but rapidly improved under massage. The results of wounds of the large joints will be separately considered.

In the remaining thirty-six cases, suppuration occurred more or less extensively along the track of the bullet. In some instances the whole track was involved, and it was necessary to enlarge both apertures, and establish free drainage, the healing in such cases being extremely tedious. In some cases of this class the suppuration was associated with the retention of a bullet, or small fragments, and healing only occurred after the latter had been extracted. Such a condition was however exceptional, and the retention of the bullet did not usually interfere with the primary union of the track. Not unfrequently it was noted that, whilst the aperture of entry and the neighbouring part of the track had healed, the distal part of the track was suppurating and discharging through the aperture of exit. It need hardly be said that in the suppurating cases, the resulting cicatricial tissue was more abundant, and consequently the impairment of movement and the pain were greater.

The two following cases are selected to illustrate the remarkable absence of any evidence of serious injury to important structures so often observed in wounds by the Mauser bullet:—

Case 1.—An Officer was admitted into hospital on August 18th, 1900, having been shot in the neck twenty-six days previously by a Mauser bullet at a range of 500–800 yards. He was standing looking half-right at the time when the bullet struck him on the left side of the neck, and knocked him down. He did not remember anything that passed during the next sixteen hours, but after that interval he regained consciousness. He was told that he had bled profusely from the entry wound during the first few hours after being wounded, and that the surgeons did not expect him to recover. Up to the time of the recovery of consciousness he brought up blood by the mouth. For the first two days there was considerable difficulty in speaking and swallowing, but this had quite disappeared by the fourth or fifth day. He stated that for twenty-four hours after the injury the right arm was quite numb and paralysed, that he did not feel pins put into it, and that voluntary power was completely lost. Motion and sensation then returned suddenly. A week later the

patient noticed that the front of the chest on the left side was of a bluish-black colour down to the level of the nipple. When he arrived in the hospital nearly a month after the receipt of the wound there was still staining reaching down to the nipple line. Recovery after the fourth or fifth day was uninterrupted.

Upon admission the wounds had healed. Entry: hardly visible on the left side of the neck, over the sterno-mastoid, at the junction of the anterior and middle thirds of the breadth of the muscle, and in a horizontal plane half an inch above the upper border of the cricoid cartilage. Exit: a little larger than entry and slightly indurated, on the right side of the neck over the sterno-mastoid, at the junction of the posterior and middle thirds of the breadth of the muscle, and in a plane 1½ inches higher in the neck than the entry (fig. 1). Both carotids were easily felt in the neck pulsating above the level of the wounds.

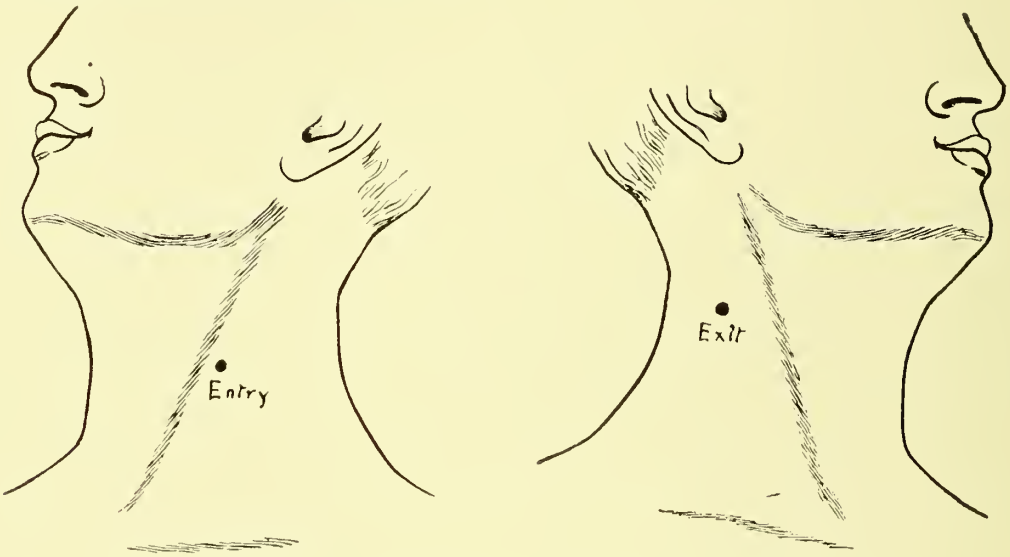


FIG. 1.—BULLET WOUND OF NECK, SHOWING POSITION OF THE WOUNDS OF ENTRY AND EXIT (CASE 1).

The case is recorded to show the extraordinary escape of the more important structures in the neck. The bullet probably passed in front of the main vessels on the left side, and, crossing between the pharynx and the front of the vertebral column, passed close to the vessels on the right side, but posterior to them (fig. 2).

CASE 2. *Gunshot Wound of Thorax and Abdomen.*—Lieut. H. was hit by a Mauser bullet on March 31st while lying down in the firing line. The range was 250–300 yards. The bullet entered the back of the left shoulder, and, traversing the thorax and abdomen, lodged under the skin of the right groin, from which situation it was removed on the following day. He felt as if he had been given a very heavy kick in the small of the back, and there was from the first much difficulty in breathing. There was very little hæmorrhage from the wound, and, as far as the patient knew, there had been no hæmoptysis or blood in the stools. On admission on April 15th the dyspnœa experienced soon after the receipt of the wound had much diminished, but there was still pain in the lower part of the left side of the chest on taking a deep breath.

Entry (healed) at the back of the left shoulder, 2 inches above the free border of the posterior fold of the axilla, and $2\frac{1}{4}$ inches below and internal to the acromial angle of the scapula. The incision made in extracting the bullet was in the right groin, $\frac{1}{2}$ in. below Poupart's ligament, and just outside its centre; it had nearly healed. A line joining the two wounds crossed the middle line of the body about 1 inch above the umbilicus (fig. 3). The bullet probably wounded the left lung; at the left base there was some dulness, with weak breath sounds. In crossing the middle line it probably passed behind the aorta and vena cava, or between these vessels, grooving or

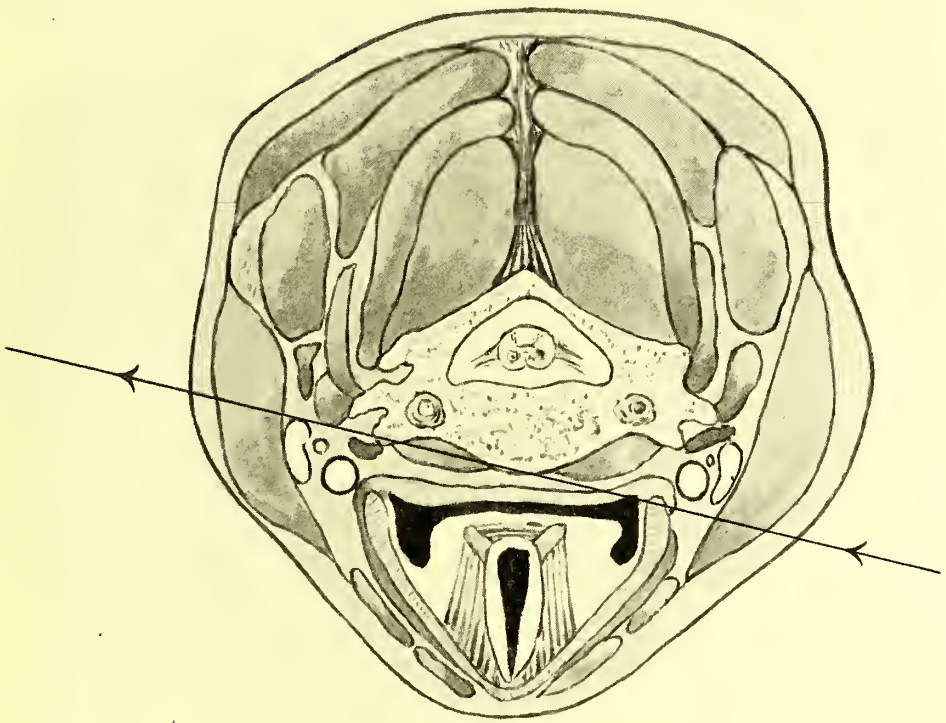


FIG. 2.—DIAGRAM OF TRANSVERSE SECTION OF NECK THROUGH FIFTH CERVICAL VERTEBRA, SHOWING PROBABLE POSITION OF TRACK OF BULLET IN CASE 1.

perforating the bodies of the vertebræ (fig. 4). There was some hæmorrhagic staining in the middle line of the back in the upper lumbar region. To reach the right groin the bullet must have passed through the peritoneal cavity, and presumably some of the intestinal coils. The patient left the hospital in a fortnight in much the same condition, except that the incision in the groin had healed.

Retained Bullets.

In twenty-seven out of the 185 wounds under consideration, the bullet, or part of it, was retained in the tissues—a proportion of about 14·5 per cent. Although this percentage may have been somewhat exaggerated by the fact that certain

cases where sent to the Base because the bullet was known to be retained, yet experience has shown that retention of the Mauser bullet is of frequent occurrence, and doubtless explained by the enormous range at which many of the wounded were hit, and hence the greatly reduced velocity of the bullet. In ten of the twenty-seven cases, the retained bullet had been extracted before the patient's admission to the Imperial Yeomanry Hospital, and in most of these cases the bullet was situated in the subcutaneous tissues. It is, indeed, interesting to note how frequently the bullet, having nearly reached the end of its flight, and being still further checked by its passage through perhaps a considerable length of the tissues, is prevented from escaping from the body merely by the skin, the elasticity of which probably takes an important part in preventing penetration.

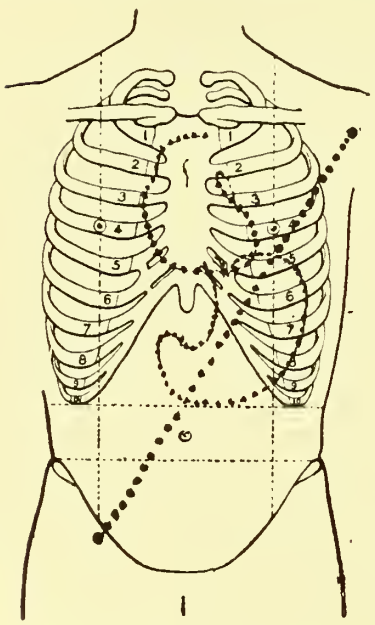


FIG. 3.—DIAGRAM OF BULLET-TRACK IN CASE 2.

The following are short records of some of the cases in which retained bullets were extracted by operation. In every instance the position of the bullet was accurately determined by Mackenzie Davidson's cross-thread localiser, and we cannot over-estimate the value of radiography in this connection. In many instances in which the retained bullet was extracted, and the symptoms caused by its presence relieved, the operation would have been impossible without the assistance of radiography, and in no case in which operation was undertaken was the evidence of the radiogram misleading.

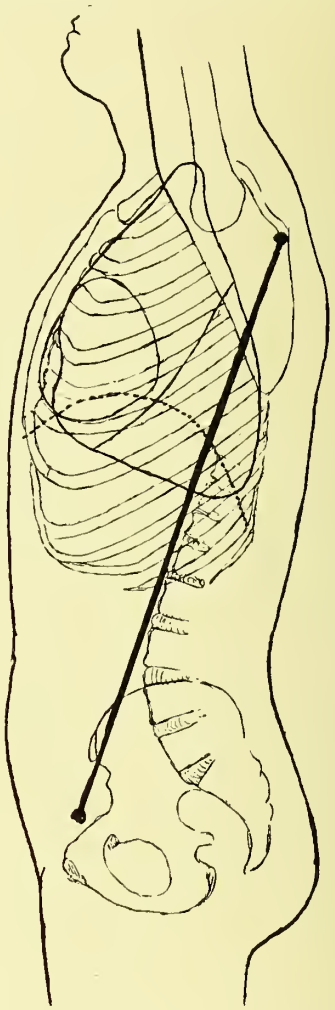


FIG. 4.—DIAGRAM OF BULLET-TRACK IN CASE 2.

CASE 3.—Pte. E., admitted April 12th, 1900, was struck in the left hip by a Mauser bullet on March 31st, while standing beside his horse. The range was 700–800 yards. The sensation was that of a heavy blow, but the man did not fall. The pain and bleeding were slight. He mounted his horse and rode over a mile to the ambulance, where the wound was

dressed with dry gauze and a bandage. It healed during the first week in hospital. Stiffness in the left hip joint appeared the day after the injury, and at the end of a week the limitation of movement was quite as pronounced as on admission. The patient had great difficulty in passing water for twenty-four hours after the injury, and on the second day considerable smarting at the root of the penis during micturition, but this gradually passed away. On admission there was considerable general wasting about the trunk, and in the left lower limb. The typical healed wound of entry of a Mauser bullet was seen two inches below and behind the left anterior superior iliac spine. There was no exit wound. There was tenderness and pain in the left groin, over the great trochanter, and shooting down the inner side of the thigh to the knee. There was much limitation of movement in the left hip joint; flexion was not possible beyond an angle of 125°, or extension beyond 145°. If further movement of the thigh was attempted, the pelvis at once moved with the thigh. There was no free abduction or adduction, and the rotation obtainable was very slight. There was no localised swelling anywhere.

With the fluorescent screen the bullet could be seen horizontally placed about two inches above the left pubic crest, with the nose pointing to the mid line of the body. By the cross-thread localiser the nose of the bullet was located at a point $1\frac{3}{4}$ inches vertically above the left pubic spine, $1\frac{1}{4}$ inches from the middle line, and at a depth of $1\frac{1}{4}$ inches from the surface.

April 24th.—Although the limitation of movement in the hip was not quite so great as on admission, tenderness in the groin and pain referred to the inner side of the knee were still present, hence it was decided to remove the bullet.

A vertical incision over the position of the bullet as mapped out by the X-rays exposed the abdominal muscles; these were separated in the direction of their fibres, and the bullet found, surrounded by a yellowish material very like pus, in a cavity $1\frac{1}{2}$ inches long by $\frac{1}{2}$ inch in diameter, in the subperitoneal tissue; the cavity had a fibrous wall $\frac{1}{16}$–$\frac{1}{8}$ inch thick. The cavity was swabbed out with 1–40 carbolic, and the wound closed without drainage. Primary union ensued, and when the patient left in a month for Cape Town, movement in the hip joint was practically normal, and the pain referred to the knee disappeared from the date of the operation.

Case 4.—Pte. E. was admitted August 18th, 1900, having been wounded in the lower part of the abdomen one month previously by a Mauser bullet at a range of 700 yards. There was not much hæmorrhage, and he did not pass any blood by the urethra or rectum subsequently. Pain around the left hip, especially upon moving the joint, had troubled him ever since. Upon admission, the wound had healed.

Entry: In the abdominal wall, $1\frac{1}{4}$ inches vertically above the left pubic spine. There was no exit wound. There was no tenderness anywhere, but the movements of the hip joint were limited by pain. Full flexion was impossible, and so was the combined movement of abduction, extension, and external rotation. By means of the X-rays the bullet was seen to be situated on a level with the neck of the left femur, and it was stated to be at a distance of $2\frac{3}{4}$ inches from the surface of the skin of the buttock (fig. 5).

Before the performance of the operation it was quite impossible to be certain as to the situation of the bullet, whether in front of, in the substance of, or behind the neck of the femur. If skiagrams of the joint could have been seen in a stereoscope, the position would have been at once evident, but this instrument was not available. It was thought, however, that a depth of $2\frac{3}{4}$ inches from the surface of the buttock meant that the bullet would be mainly situated behind the neck of the femur. An oblique incision in the buttock was therefore made parallel to the fibres of the gluteus maximus. These fibres were separated, the great sciatic nerve pulled to the inner side, the upper part of the quadratus femoris divided, and the joint capsule thus exposed.

FIG. 5.—MAUSER BULLET EMBEDDED IN THE NECK OF THE FEMUR (CASE 4).

(Skiagram by Mr. J. Hall-Edwards.)

The capsule was incised, and the nose of the bullet was then seen protruding from the posterior compact layer of the neck of the femur for a distance of a quarter of an inch. It was firmly embedded, but by a little gouging it was loosened and extracted.

The patient made an uninterrupted recovery, and the movements of the hip were almost complete when he left the hospital three weeks later for Cape Town.

Case 5.—Pte. P. was shot while lying down, at a supposed range of 500 yards. The bullet passed through the right calf and entered the left calf at its middle. When admitted into the I.Y.H., the three wounds had healed under scabs; there was a tender spot on the antero-external aspect of the left leg at its middle. A skiagram showed the bullet lying in front of the tibia with the apex pointing upwards and backwards. The exact depth of the bullet having been determined, it was extracted without difficulty.

Case 6.—Pte. C., admitted June 15th, 1900, was wounded on May 29th while lying down in the firing line. The range was unknown. In addition to wounds in the hand, forearm, shoulder, and back, a bullet entered the left thigh.

Entry—nearly healed—4½ inches vertically below the anterior superior iliac spine. The bullet could be felt under the skin on the outer aspect of the thigh, 4 inches above the knee-joint. Although the position of the bullet was obvious, the thigh was skiagraphed. By looking at the photograph without previous examination of the limb, it was impossible to gain a correct idea of the depth of the bullet from the surface. The picture might have led one to think that it was lying embedded in the soft tissues close to the bone, whereas in reality it was immediately beneath the skin (fig. 6). A stereoscopic picture of the thigh, or one of the methods of localisation, would have indicated at once the depth of the bullet. In this case such a procedure was unnecessary, and the record has simply been made to demonstrate the very incomplete information that a single X-ray photograph may afford. The bullet was without difficulty removed under local anæsthesia. It was an unusual type of bullet, somewhat larger than the Lee-Metford—probably a Guedes.

Case 7.—Pte. S. was wounded twice at Senekal, at a range of 1500 yards, an interval of half an hour elapsing between the receipt of the two wounds. On admission into the I.Y.H. on the thirteenth day, there was a granulating wound, presumably the entry of both bullets, situated over the eleventh rib of the left side, and in a vertical line through the angle of the scapula. The point of exit of one of the bullets was situated ½ inch to the right of the third lumbar spine, and the other bullet could be felt through the skin at a rather lower level. The retained bullet was extracted after producing local anæsthesia with eucaine. It lay in the erector spinæ muscle; its nose had set up, and the lead was protruding. There was a small collection of pus around the bullet.

Case 8.—Lance-Corporal J. was admitted into hospital October 31st, 1900, having been wounded in the left hip by a ricochet Mauser bullet five months previously at a supposed range of twenty yards. He was standing at the time, but the blow did not knock him over. There was severe hæmorrhage from the wound. A fortnight later a piece of casing was removed from above the pubes in the region of the exit wound. From that date up to the time of admission to the Yeomanry Hospital, six operations were performed, consisting mainly of scraping sinuses or making counter incisions to drain abscesses.

Upon admission there was a discharging sinus in the left buttock, 2¾ inches behind the centre of the outer surface of the great trochanter. This sinus marked the aperture of entry, and a probe passed inwards along the posterior surface of the trochanter for 4½ inches. There was not much discharge. The exit was healed, and was represented by a scar 1 inch long

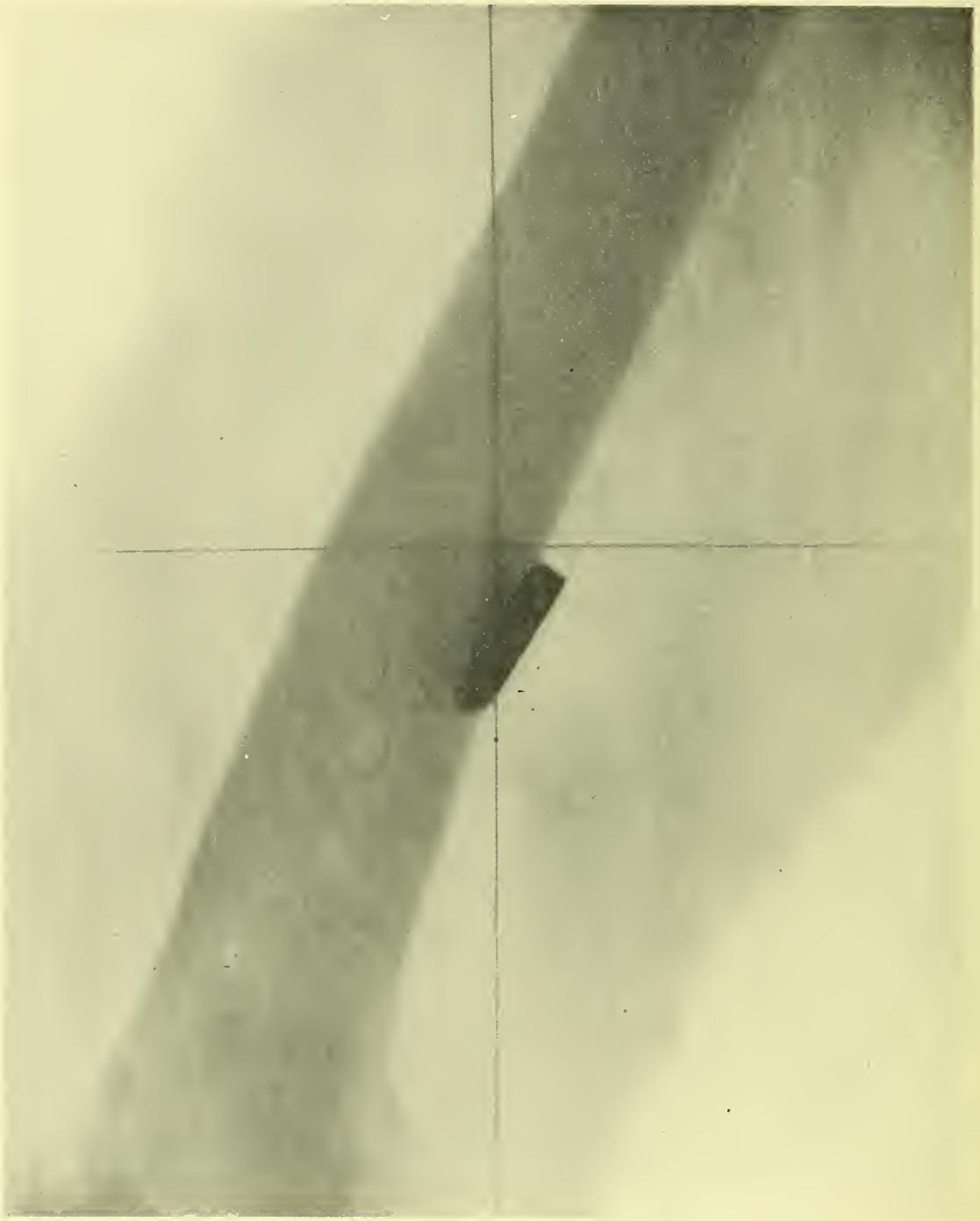


FIG. 6.—SKIAGRAM OF MAUSER BULLET IN THIGH (CASE 6).

(The bullet, which lay immediately beneath the skin, appears in the picture to be close to the femur.)

(*Skiagram by Mr. J. Hall-Edwards.*)

immediately above the left pubic crest. The movements in the left hip were considerably limited. Flexion was possible only to an angle of 80°, extension to not more than 135°. Abduction and rotation were much limited.

By means of the X-rays it was seen that the posterior part of the great trochanter had been splintered, that a hole was present in the bone, and that by the side of this aperture there was a fragment of metal. This was stated to be $1\frac{1}{8}$ inches from the skin surface over the trochanter, and $2\frac{1}{2}$ inches in front of and above the sinus of entry. Another fragment was seen at the upper and inner part of the thigh over the obturator foramen, and it was stated to be at a depth of 1 inch from the skin surface.

At the operation, the sinus of entry was enlarged, and the track followed round the back of the trochanter and the neck of the femur, towards the position of the fragment that had been located at the upper and inner part of the thigh. At a distance of $5\frac{1}{2}$ inches from the entry wound, the fragment was found at the extremity of the track and at a depth of 1 inch from the skin of the thigh, according to the X-ray localisation. The foreign body was a piece of the leaden core of the bullet. No prolonged search was made for the fragment near the trochanter—the tissues in this region appeared to have healed over, and it was thought that it had probably become encapsuled, and was not the cause of the continuance of suppuration.

The patient went to Cape Town seven weeks later; the wound had very nearly healed, there was very little discharge, and the hip movements were much less limited. Eight months after reaching England, as the sinus had not closed, the trochanter was explored, and the missing fragment embedded in it extracted. The wound then finally closed, and the recovery was uninterrupted.

The case shows that it is sometimes necessary to remove every fragment of metal in a wound before healing will take place. We found that not infrequently the tissues would apparently heal soundly over pieces of casing or lead embedded in them, and that it was only after many weeks or months that these foreign bodies would commence to cause irritation, and an abscess form around them.

Case 9.—Trooper W. was wounded in the forearm at Senekal on May 25th, 1900, probably by a Martini bullet at short range. On admission to the I.Y.H. on the twenty-second day, the whole track was suppurating. The wound of entry on the outer aspect of the middle of the forearm was $\frac{1}{2}$ inch in diameter; the exit wound on the posterior aspect of the limb, at a rather higher level, measured $1\frac{1}{2}$ inches by 1 inch. Radiographic examination showed no evidence of fracture, but a small fragment of metal was seen near the aperture of entry. An anæsthetic was given to break down adhesions in the elbow, and a small incision was made to remove the fragment of the bullet, but it could not be found. Several weeks later, long after the wound had healed, a tender hard lump formed in the flexor muscles of the forearm. An incision was made and a small abscess opened in the substance of the muscles; it contained a minute fragment of lead. A few weeks later the man returned to the front.

Case 10.—Trooper H. was struck in the front of the right thigh, probably by a fragment of a ricochet bullet. A month later the wound, which measured $1\frac{1}{2}$ inches in diameter, had not quite healed. By X-ray examination a small fragment of metal was seen below the wound, and $1\frac{1}{2}$ inch from the surface. The fragment, which was embedded in fibrous tissue in the crureus muscle, was removed. The operation was followed by cellulitis of the thigh, for which multiple incisions were necessary.

Case 11.—Pte. M. was admitted into the I.Y.H. August 31st, 1900, having been wounded several weeks before at Bethlehem. On admission walking was prevented by pain in the left hip.

The scar of the wound of entry was over the left hip. The bullet was located on the posterior surfaee of the left half of the saerum, $\frac{1}{2}$ in. from the skin surfaee and $1\frac{1}{2}$ in. from the middle line, the nose of the bullet pointing upwards. The bullet was extraeted through an incision in the line of the fibres of the gluteus maximus; it lay in a small eavity in the bone. The wound healed by first intention, but ten days later an abseess beneath the scar was opened; sinuses resulted, and carious bone was subsequently scraped.

Case 12.—Pte. S. was shot in the right buttock, at a supposed range of 1000 yards. On admission, on the thirteenth day, there was a small scar marking the point of entry, an ineh from the right margin of the anus. There was pain with tenderness on pressure $2\frac{1}{2}$ in. below and outside the right posterior superior iliae spine; the pain was most marked on walking, and extended down the right thigh. There were signs of consolidation of the apex of the left lung, and the sputum eontained tuberele baeilli. By skiagraphy the bullet was seen to be lying at the upper border of the great sciatic noteh, and its exaet depth from the surfaee was estimated. Through an ineision in the line of the fibres of the gluteus maximus, the upper border of the sciatic noteh was exposed; the nose of the bullet lay on the anterior aspect of the sacrum, and it was removed with the finger and a direetor. The wound healed by first intention Some stiffness of the right hip persisted after the operation.

Case 13.—Lieut. R. was aeeidentally shot in the right knee by the bullet of a revolver, on May 22nd, 1900. On admission to the I.Y.H., on May 24th, the temperature was 103°, and the patient was suffering from dysenterie diarrhœa; the right knee was distended and tender, and the wound of entry of the bullet was situated over the internal eondyle. The position of the bullet having been aseertained by the X-rays (fig. 7), an incision over it was made in the outer half of the popliteal spaee, and the bullet removed by dividing the eapsule; it lay immediately within the eapsule, in eontaet with the external condyle, whieh was fraetured at its border; the bullet had penetrated the internal eondyle. Lateral ineisions were then made into the joint, and a large quantity of ereamy blood evacuated; the joint eavity was irrigated with boric lotion; the lateral ineisions were plugged with cyanide gauze; the limb was fixed on a baek splint. The joint reeovered perfeetly, but the track of the bullet persisted as a sinus, whieh was seraped on two occasions, and subsequently healed. Eighteen months after the injury the movements of the joint were perfeet.

Case 14.—A Boer was admitted to the hospital on Deeember 11th, 1900, having been wounded eighteen days previously by a Lee-Metford bullet, at a range of 300 yards, while lying prone upon the ground. He stated that the bullet passed through one of his eomrades before hitting him. A few days elapsed before he eould obtain hospital treatment.

Upon admission the left knee-joint was found semi-fixed, mueh swollen, very tender, and the least attempt at movement eaused aeute pain. The temperature was 102°. There was a granulating wound $\frac{3}{4}$ in. aeross, diseharging pus freely, situated on the anterior aspeet of the joint, immediately to the outer side of the apex of the patella. There was no exit wound. By means of the X-rays the bullet was seen lying just above the upper and outer part of the joint, with its nose towards the aperture of entry. The anterior part of the external condyle showed some injury. By loealisation, the nose of the bullet was found to be at a depth of 1 in., and the base at a depth of $1\frac{1}{8}$ inehes from the skin of the outer surface of the limb.

The next day the wound was enlarged under ehloroform and the joint explored. The apex of the patella was found splintered and the upper part of the external femoral condyle tunnelled by the passage of the bullet. The latter was found lying in an abseess eavity containing two or three ounees of pus, on the outer aspect of the femur, just above the eondyle. The whole joint was in a

FIG. 7.—REVOLVER BULLET IN THE KNEE JOINT (CASE 13).
(Skiagram by Mr. J. Hall-Edwards.)

state of acute inflammation. Free lateral incisions were made into it, and it was fixed in the extended position.

After two or three months' treatment all the wounds soundly healed, and the patient was walking about with considerable freedom of movement in the joint. It seems most probable that in this case the bullet, with much of its initial energy dissipated, and its true spin interrupted by

FIG. 8.—BULLET WOUND, SHOWING POSITION OF ENTRY IN RIGHT CHEEK (CASE 15).

passing through the body of the first Boer, struck the knee base first, and was then just able to perforate the external condyle, but not to make an exit wound. The fact that the point of the bullet was looking towards the entry wound, and the large size of the latter, lend support to this view.

CASE 15.—A soldier was shot in the right cheek, the bullet being retained (fig. 8); the wound was followed by slight bleeding from the mouth. On admission there was considerable pain in the

left side of the neck with every movement of the head, and there was tenderness on deep pressure behind the angle of the jaw. The position of the bullet was accurately determined by the cross-thread localiser. An incision was made on the left side of the neck, behind the jaw, and the dissection carried down to the vertebræ; the bullet lay on the front of the spine, behind the pharynx (fig. 9). It was extracted with toothed forceps. The pain in movement of the head was relieved by the operation.

Fractures from Bullet Wound.

In 25 of the 185 bullet wounds to which these notes refer, the existence of fracture was ascertained. The 25 fractures were distributed as follows: Clavicle,

FIG. 9.—RETAINED BULLET IN NECK (CASE 15).
(Skiagram by Mr. J. Hall-Edwards.)

1; scapula, 1; humerus, 5; radius, 1; radius and ulna, 3; unciform, 1; femur, 1; tibia, 4; fibula, 2; tibia and fibula, 2; os calcis, 1; metatarsus, 2; neck of jaw, 1. In addition to these 25 cases, there were a large number in which penetration of a bone had certainly occurred, but in which either the osseous tissue was cleanly drilled, or in which fissures had healed without deformity, so that no evidence of fracture existed. Among the 25 cases, there was no instance of ununited fracture. In 16 the wounds had healed without suppuration, and in the remaining 9 cases,

suppuration ensued, with the result that the course of the case was often extremely tedious, and healing long delayed by the separation of sequestra.

The following are illustrative cases of fracture from bullet wounds:—

Case 16. *Fracture of Lower Jaw.*—Pte. S., admitted into hospital June 15th, 1900, had been wounded in the face on May 29th by a Mauser bullet, at a range of 200–300 yards. He was resting on his elbow at the time, and at once fell flat on his face, and remained unconscious for three or four hours. The blow seemed to be a very heavy 'crashing' one. After some hours he was carried off the field and placed in an ambulance wagon, and on the next day reached a hospital. The wound in the face and nose bled for over a week, and ever since the receipt of the wound the lower jaw had been very stiff and the right side of the face and the tongue numb. On admission the wounds had healed.

Entry: very small, hardly visible, on the left side of the face in the centre of a line from the inner canthus to the lower border of the ala of the nose. Exit: immediately behind the lobule of the right ear, at its junction with the skin of the neck. There was considerable tenderness just in front of the exit wound, with some thickening below the condyle of the jaw. The movement of the lower jaw was very limited. The incisor teeth could only be separated for $\frac{1}{3}$ inch. When an attempt was made to close the jaw the molar teeth on the right side came in contact and prevented the incisors meeting by $\frac{1}{8}$ inch. This was in consequence of some lateral deviation of the jaw to the left, the interval between the upper incisors coming over the middle of the right lower central incisor. The skin was anæsthetic in the area of distribution of the mental branch of the right inferior dental nerve. Anæsthesia also existed along the red margin of the right half of the lower lip, the buccal surface of the lip, and the outer surface of the gum of the lower jaw from the central incisor to the second bicuspid, as well as on the right side of the tongue. The posterior limit of the area of anæsthesia on the gums and tongue was difficult to determine, owing to the impossibility of free opening of the jaws; but on the tongue the anæsthetic area appeared to involve the anterior third of the organ on the right side, but did not extend quite as far forward as the tip. There was blocking of the left nasal duct, all the tears running over the cheek.

It was evident that the bullet had perforated the ascending process of the left upper jaw, and that it had injured the neck of the lower jaw on the right side. A skiagram showed the neck of the jaw on the right side to be fractured, and united at an angle. By forcible manipulation under chloroform the movement of the lower jaw became less limited, until, in three weeks' time, when he left the hospital for Cape Town, the patient was able to open the mouth $\frac{3}{4}$ in.; he could bite freely, the interval between the upper incisors came over that between the lower, and the teeth were beginning to fit more evenly into each other.

Case 17. *Fracture of Humerus.*—Pte. M. was admitted into hospital July 6th, 1900, having been wounded in the right shoulder on May 29th by a Mauser bullet at a range of 800 yards. The arm at once fell powerless to the side. On admission the wounds had healed.

Entry: on the right side of the back, 1 inch internal to the vertebral border of the scapula, and on a level with the junction of this border with the spinous process. Exit: in the middle line of the anterior surface of the right upper arm at the junction of its middle and upper thirds. The bullet must have passed between the ventral surface of the scapula and the chest wall.

The limb was skiagraphed, and a fracture of the humerus, about 1 inch below the surgical neck, was seen. The bone had united with very little deformity, and the shadow thrown by the uniting callus at such an early date (six weeks) was exceptionally distinct. Some fragments were seen in the photogaph near the exit wound; they were portions of the casing of the Mauser bullet, and were removed later under cocaine.

Case 18. *Fracture of Radius and Ulna.*—Pte. C., admitted into hospital March 20th, 1900, was wounded at Paardeburg on February 18th, while advancing towards the Boer trenches. The range was 500 yards. The patient thought that he was hit by a Martini bullet, but only because of the size of the wound of entry. There was not much reason, however, for doubting that the wound was caused by a Mauser bullet. At the moment of injury, the limb was thrown back by the impact, and the patient was turned half round. The blow was of a dull and heavy character, and the arm was at once rendered powerless. It was bandaged fifteen minutes after the receipt of the wound.

Entry: healed, on anterior aspect of right elbow-joint, 1 inch below, and to the outer side of the centre of the joint. It was not much larger than the usual scar of entry of a Mauser bullet. Exit: nearly healed, on the same level as entry, on posterior aspect of forearm, to the inner side of the posterior border of the ulna, and 2 inches below the tip of the oleeranon process.

The limb was kept in a position midway between pronation and supination, and these movements were very limited, not more than 15° of rotation being possible. There was some limitation of extreme flexion and extension. The exit wound healed in a few days, and the patient left for Cape Town on April 15th, the limitation in the movements of the limb being practically the same as on admission.

Case 19. *Fracture of Femur.*—Trooper R. was admitted into hospital August 1st, 1900, having been wounded two months previously in the right thigh by, in all probability, a Mauser bullet at a range of 150 yards. Shortly after being wounded, he was obliged to travel 200 miles in an ox wagon, and the case is recorded to show the result obtained in the circumstances. Upon admission the wounds looked as if they were due to a Mauser bullet, and they were healed.

Entry: at the centre of the inner surface of the right thigh. Exit: at the same level as entry, and at the junction of the external and posterior aspects of the limb. The bone had united firmly, but the muscles of the thigh were greatly wasted; there were 2 inches of shortening, and the knee could only be flexed 10°. The overlapping of the ends of the bone was well seen in the skiagram.

When the patient left the hospital three months later, only very little more movement had been gained in the knee, in spite of repeated forced flexion under chloroform.

Case 20. *Fracture of Tibia and Astragalus, involving Ankle Joint. Suppuration.*—Trooper D. was admitted on September 4th, 1900, having been shot at a supposed range of 150 yards on August 24th. The bullet passed through the ankle from a point over the internal malleolus to a point below the external malleolus; there was a free purulent discharge from the aperture of exit. The wounds were enlarged, and loose fragments of the internal malleolus and astragalus removed. Another incision was made behind the external malleolus, drainage tubes inserted, and a cyanide gauze dressing applied. For three weeks the evening temperature varied between 100° and 101° F., after which it was nearly normal, and the discharge rapidly diminished. On November 4th the wounds were quite healed, and there was considerable movement in the ankle joint.

Case 21. *Fracture of Tibia, involving Knee Joint. Suppuration.*—Corpl. C. was wounded outside Mafeking on May 13th, 1900, presumably by a Martini bullet at a short range. The bullet, after passing through his horse, wounded the upper end of the right leg. There was free bleeding, and no dressing was applied for several hours. On May 18th the first dressing was removed, and an 'operation performed,' probably an abscess being opened and drained. Suppuration continued. On admission to the I.Y.H. on June 21st, there was irregular fever varying between 100° and 104° F.; profuse sweating; sleep prevented by starting pains in the limb.

There was an extensive suppurating wound over the front of the upper extremity of the right tibia, exposing an irregular oblique fracture, and numerous small sequestra. The fracture did not appear to extend into the knee joint, but the joint cavity was distended, and the whole region of the knee acutely tender. On June 22nd the knee was freely opened by two lateral incisions, and pus evacuated; several sequestra were removed from the tibia, the knee was freely drained, and a back splint applied. The suppuration continued to extend in the substance of the upper part of the tibia, and in the superficial tissues around the knee, and the fever persisted. Numerous additional incisions were made on July 2nd, 5th, and 12th, and a Thomas's knee splint was applied. The elevation of temperature persisted for a month, after which the general condition improved, the suppuration gradually ceased, and the incisions healed. At the middle of September the patient began to walk with crutches, and on October 1st the knee was firmly ankylosed, and all the incisions, except one in the popliteal space, were soundly healed. The patient was subsequently seen in England, the knee being firmly ankylosed in an extended position, and the general health perfect.

Case 22. *Fracture of Tibia. Suppuration.*—A trooper in the Protectorate Regiment was shot at short range in a sortie from Mafeking on Game Tree Fort, December 26th, 1899. The right leg was fractured, and was kept on splints for sixteen weeks; suppuration occurred in the wound, and incisions were made, fragments of bone probably having been removed. On admission to the I.Y.H., June 15th, 1900, there were numerous scars and discharging sinuses about the middle of the leg; one of the sinuses on the outer aspect, behind the fibula, indicating the point of entry, and a scar over the inner surface of the tibia the point of exit. The sinuses were freely opened up, and found to lead to a carious cavity in the posterior and outer part of the tibia, containing one small sequestrum. The cavity was scraped, flushed, and loosely plugged with gauze. Seven weeks later the cavity was again scraped, and soft carious bone removed. Three months later, when the patient was sent to Cape Town, the sinuses were still not completely healed. This case well illustrates the tedious course of a septic gunshot fracture. The persistent suppuration is maintained by the presence of necrosed fragments, and by the septic osteitis which leads to caries of the surrounding bone. The latter condition was well illustrated by the following case:—

Case 23. *Bullet Wound of Navicular Bone.*—Trooper E., admitted into hospital April 25th, 1900, accidentally shot himself in the left foot with his Lee-Metford rifle while lying down on April 18th. Two days later he was taken to one of the hospitals, and after another week the foot began to swell, and there was much pain and discharge. On admission later to the Imperial Yeomanry Hospital the healed scar of entry was seen on the dorsum of the left foot in the middle line, 1 inch on the distal side of a line joining the tips of the malleoli across the front of the ankle joint. The exit was seen in the sole just to the outer side of the middle line, and at the level of the metatarso-phalangeal articulations; it was discharging a little pus. By means of the X-rays it was clearly seen that the injury was confined to the navicular bone, the other bones of the foot being intact. Clear patches, alternating with irregular darker areas, were seen throughout the shadow cast by the bone, contrasting markedly with the healthy appearance of the shadows thrown by the remaining bones of the foot. There was evidently rarefying osteitis of the navicular, and on May 7th the bone was explored from the sole, and the whole of the internal structure scraped away, leaving a mere shell bounding the cavity. The cancellous tissue was in a condition of suppurative osteomyelitis. Healing was very slow, and in three months' time the patient left for Cape Town, with only a small superficial wound in the sole.

Bullet Wounds of Joints.

Among the cases in which one of the large joints had undoubtedly been penetrated by a bullet, we found the following conditions when the cases came under our care:—(*a*) No impairment of movement and no swelling, the only evidence of penetration being the situation of the points of entry and exit; (*b*) varying degrees of pain and stiffness, sometimes with slight effusion even after several weeks: the stiffness in such cases usually yielded to massage; and (*c*) suppuration in the joint. (Examples of such have already been given, Cases 20 and 21.)

In the following case of wound in the knee joint, the fever due to the incidence of enteric was at first mistaken for the fever of suppurative arthritis:—

Case 24.—Corpl. B. was wounded in both knees at Dreifontein on March 10th, 1900. A few days later the right knee became inflamed, and on March 22nd pus was evacuated from the joint by incisions, and a drainage-tube inserted. On admission to the I. Y. H. on April 25th, the apertures of entry and exit in the upper part of the right knee were discharging small quantities of pus; an incision which had been made into the inner part of the joint had nearly healed. The joint was slightly swollen, flexed, very tender, and the seat of starting pain at night. The elevation of temperature was slight (chart lost). A back splint and weight extension were applied, the flexion was quickly reduced, and the pain much relieved. On May 4th, the knee being still swollen and the temperature elevated, two free lateral incisions were made into the joint; the synovial membrane was greatly thickened and gelatinous; there was no pus in the joint, but there were soft adhesions between the patella and the femur. The joint was flushed with 1 in 3000 mercurial solution, the incisions loosely plugged with gauze, and a bracketted Liston's splint applied. The temperature continued to fluctuate between 101° and 104°, and the diagnosis of enteric was entertained. On May 9th the blood gave a well-marked Widal's reaction. Death occurred on May 13th in the typhoid state. At the autopsy, typical typhoid ulceration was found in the small intestine. The knee joint showed, in addition to swelling of the synovial membrane, erosion of the cartilage on the surfaces which lay in contact, and partial destruction of the semilunar cartilages. If the patient had recovered from the enteric, it is probable that the knee would have been a useful ankylosed joint.

Among the cases of bullet wounds of the extremities under our care, amputation was only once performed. In this case the operation was rendered necessary by extensive suppuration in the leg, following a comminuted fracture of the fibula. The bullet, probably a soft-nosed Mauser, had passed through the other leg, fracturing the tibia and fibula.

Nerve Injuries from Bullet Wound.

With reference to injuries of nerves produced by the Mauser bullet, our opinions agree in the main with those expressed in Mr. Makins's book upon the Surgery of the War. We have not been able to obtain the after histories of many of the cases of nerve injury which came under our observation,

although efforts have been made in this direction, but from the very pronounced symptoms which followed what appeared to be merely a contusion of the nerve—paralysis, with complete loss of faradic irritability, lasting many weeks, profound wasting, and areas of anæsthesia, which were only very slightly smaller in extent two or three months after the receipt of the wound—it seemed to us that perfect recovery of function in the parts supplied by the contused nerve was not likely to follow in all cases. Possibly the scar in the nerve at the seat of contusion, by a bullet travelling at a very high velocity, is of such a length, and of so dense a nature, that the new nerve fibres have considerable difficulty in crossing it. We think it probable that if some of these cases of severe contusion were treated by excision of the scar at the end of two or three months, and the ends of the nerve united by suture, a more complete recovery might be looked for, and possibly some time gained.

The severe forms of traumatic neuritis were not often observed, but one man who had been shot through the thigh by a Martini bullet, which had injured the sciatic nerve, and caused paralysis of the muscles supplied by the external popliteal, was obliged to undergo amputation of the foot one year later for extreme talipes equino-varus, and excruciating pain referred to the foot, upon the toes of which trophic sores were threatening. The operation was performed after he returned to England.

In two or three instances in which a mixed peripheral nerve had been injured some months previously, although wasting of the muscles was slight, yet all the muscles supplied were weak. When any concerted movement of the muscles of the part affected was attempted, clonic spasms of the limb were started, and continued throughout the progress of the movement. Clonus of this type proved very intractable to treatment.

As has been observed by other writers, the small amount of injury visible to the naked eye at exploratory operations upon the peripheral nerves is very marked when contrasted with the widespread loss of function in the distribution of the nerve. The following case is a good example of this:—

Case 25.—Pte. G., admitted April 12th, 1900, was wounded in the left shoulder, while mounted, twelve days previously. The range was unknown, and so was the nature of the bullet, but from the character of the wounds it was probably a Mauser. He did not fall off his horse, and, though bleeding profusely, managed to ride two miles to the dressing station. The shoulder and arm began to swell soon after the receipt of the wound, and reached a maximum in two days. It had since gradually decreased. On admission the wounds in the left shoulder were nearly healed.

Entry: on the back of the shoulder, in the middle of the lower border of the posterior fold of the axilla. Exit: near the middle of the lower border of the anterior fold of the axilla.

There was much bluish-black discoloration down to the middle of the upper arm, both in front and behind, and it spread from the axilla over the front of the chest wall. There was still

considerable swelling in the axillary region and œdema of the limb as far as the wrist. There was no evidence of injury to the bone; the pulse at the left wrist was absent, that on the right side was normal. Movements in the shoulder joint were limited owing to stiffness and pain, but the deltoid, pectorals, and latissimus dorsi acted well. There was no power whatever of flexion or extension of the elbow, and the biceps felt extremely hard, as if there had been extravasation of blood within its substance. There was complete wrist-drop, and no power of abduction or adduction of the fingers, or extension of the meta-carpo-phalangeal joints. There was very slight power of flexion of the wrist and fingers.

The areas of anæsthesia, mapped out soon after admission, are shown in fig. 10.

Seven and a half weeks after the receipt of the injury there was no return whatever of power in the paralysed muscles,

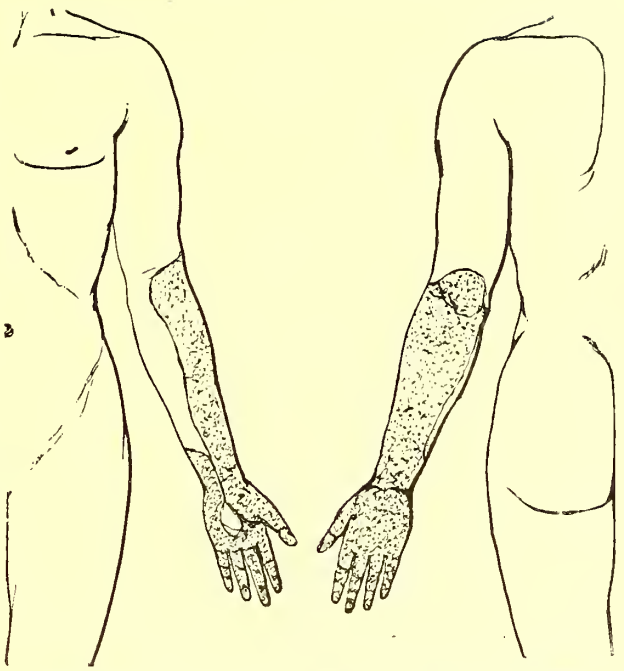


FIG. 10.—INJURY OF BRACHIAL PLEXUS BY BULLET WOUND: AREAS OF ANÆSTHESIA (CASE 25).

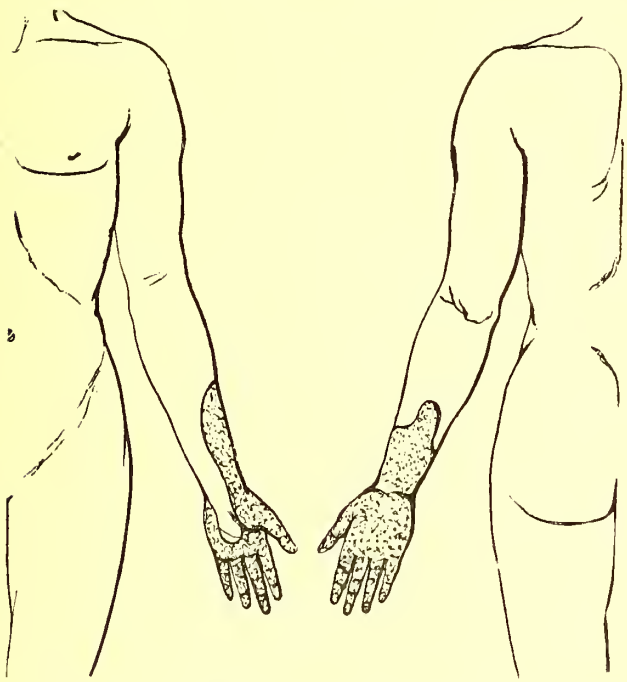


FIG. 11.—INJURY OF BRACHIAL PLEXUS BY BULLET WOUND: AREAS OF ANÆSTHESIA FIVE WEEKS AFTER OPERATION (CASE 25).

except to a very slight extent in the triceps. There was no reaction to faradism, but increased excitability to galvanism in the triceps, the muscles of the back of the forearm, and of the hand. The flexors of the wrist and fingers reacted to faradism. The biceps would not contract to either current. The areas of anæsthesia remained practically the same as before. The injured nerves were exposed by an axillary incision, and the pectoralis major partially divided. Neither the external cutaneous, median, ulnar, nor musculo-spiral were found divided or apparently diminished in calibre. A very small amount of scar tissue was found around the nerves and the axillary artery at the lower border of the subscapularis. They were freed. The artery at the injured spot was quite occluded. Considering the amount of functional disturbance, the small amount of injury found in the axilla was remarkable.

Five weeks later he left the hospital, and has been lost sight of. At that time

there was still no recovery of power below the elbow, but the anæsthetic areas had diminished, as shown in fig. 11. There was a little power in the biceps.

Case 26. *Wound of Ulnar Nerve.*—Pte. R., admitted March 20th, 1900, was wounded in the left forearm on February 18th by a Mauser bullet at a range of twenty yards. Upon admission the wounds had healed.

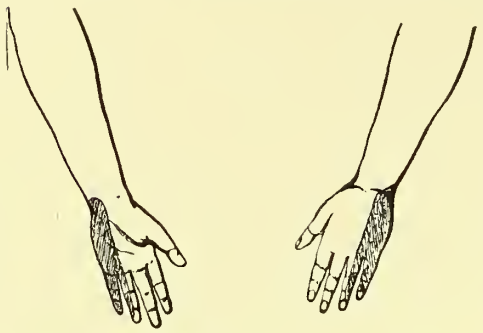


FIG. 12.—BULLET WOUND OF ULNAR NERVE: AREA OF ANÆSTHESIA (CASE 26).

Entry: upon the back of the forearm, immediately below its mid-point, and to the inner side of the posterior border of the ulna. Exit: at a level one inch above that of entry upon the inner half of the anterior surface.

The ulnar side of the hand was anæsthetic as seen in fig. 12; upon the ring finger the anæsthetic area extended to half an inch from the tip upon the ulnar border. There were no trophic changes in the fingers.

There was great wasting of the hypothenar and thenar eminences and of the interossei. There was hyper-extension of the metacarpo-phalangeal joints. The fourth and fifth fingers were kept semi-flexed, but could be fully extended passively. There was no power of abduction or adduction of the fingers. In the muscles of the hand supplied by the ulnar nerve, there was complete loss of excitability to faradism.

A week after admission the ulnar nerve at the seat of injury was exposed. For a distance of an inch it was found embedded in dense scar tissue, and it was estimated that at the point of impact of the bullet, one-third of the thickness of the nerve had disappeared. There was some attempt at bulbous formation above the point of injury. The nerve trunk was carefully freed all round, and laid again in its bed. The wound healed by first intention.

Two months later the patient left the hospital. At that time no power had returned to the paralysed muscles, and the loss of faradic irritability was still complete; there was, however, some diminution in the galvanic irritability compared to the condition upon admission. The anæsthetic area was much smaller, and the front and back of the little finger were the only parts that still remained completely anæsthetic. He could feel over all the rest of the previously anæsthetic area, though sensation was dulled. In April 1902 the hand was much stronger, but the anæsthetic area was still present.

Case 27. *Injury to Median Nerve.*—Trooper A., admitted April 12th, 1900, was wounded in the right arm on March 31st, while riding, at a range of less than 100 yards. He was carrying his rifle in his hand, and the blow, which felt as if he 'had been hit on the funny bone,' caused him to drop his rifle at once. The loss of blood was severe, and he fainted shortly after being hit. There was very little pain. Upon admission, both wounds were about an inch in diameter, and suppurating profusely.

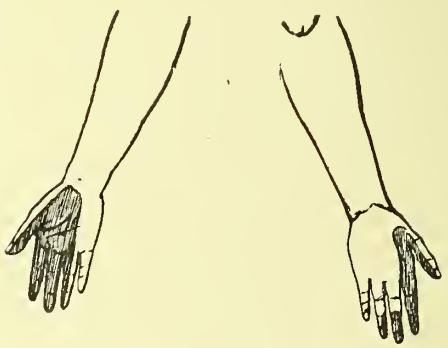


FIG. 13.—BULLET WOUND OF MEDIAN NERVE, AREA OF ANÆSTHESIA (CASE 27).

Entry: immediately above and in front of the internal condyle of the right humerus, the margin of the wound being half an inch from the tip. Exit: on the outer aspect of the forearm, immediately above the middle, and just in front of the radius. There was no injury to the bone.

There was some limitation in the movement of the elbow joint, and the power of flexion of the wrist and fingers was feeble. There was hardly any power of flexion of the index finger. There were areas of anæsthesia upon the hand as shown in fig. 13. The ulnar nerve appeared to be uninjured.

In six weeks' time, when the wounds had healed, the anæsthetic areas had considerably contracted, the movements of the elbow were normal in extent, the index finger had still very little power of flexion, but the other fingers had improved. Ten days later the man could feel over all the shaded areas, but upon the index finger he could not accurately localise impressions, though he did this quite correctly elsewhere. In October 1902 the condition remained apparently unchanged.

Case 28. *Injury to Median Nerve.*—Pte. W., admitted August 31st, 1900, was wounded in the left forearm on July 23rd, by a Mauser bullet at a range of 400 yards. The blow appeared to be a very heavy one, and the fingers began to tingle at once, and continued to do so, especially when touched. There had been numbness in the thumb and next two fingers ever since the injury, and this had not improved. From the time of the wound he had not been able to move his fingers properly. Before admission the wounds had healed.

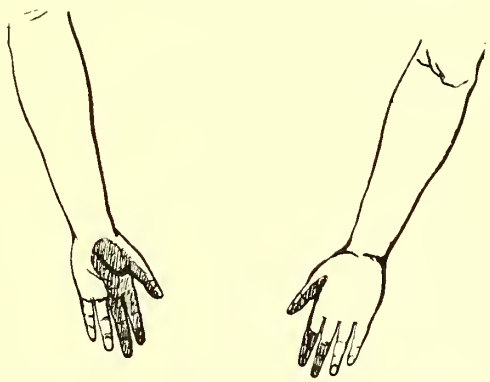


FIG. 14.—BULLET WOUND OF MEDIAN NERVE: AREA OF ANÆSTHESIA (CASE 28).

Entry: upon the flexor surface of the forearm, $3\frac{1}{2}$ inches above the wrist, and immediately outside the tendon of the flexor carpi radialis. Exit: immediately behind the ulnar margin of the forearm, $2\frac{1}{2}$ inches above the styloid process of the ulna. Upon the ulnar side of the entry wound there was an indurated tender mass, $1\frac{1}{2}$ inches in diameter, to which the skin was not adherent. The outer half of the palm and the palmar surfaces of the thumb, index, and middle fingers were covered with thick epidermal scales, in contrast with the palmar aspects of the ring and little fingers, which were healthy. There was, in addition, anæsthesia in the area of distribution of the median nerve in the hand, as shown in fig. 14.

The power of flexion of the wrist was good, but the grip was very feeble, and the thumb, index, and middle fingers could not be fully flexed into the palm, nor could they be fully extended voluntarily. They were habitually kept in a position of semi-flexion, though the movements of the ring and little fingers were quite free. The muscles of the hand supplied by the median nerve possessed no faradic excitability.

Three weeks after admission, as the lump in the forearm became still more painful, it was explored under chloroform. It was found to be a mass of scar tissue, in the middle of which was the median nerve, intimately adherent to the muscles around. The nerve was so scarred and adherent at the seat of injury that half an inch of it was re-sected the sections passing through healthy nerve tissue, and the ends united with fine silk. The tendon of the flexor longus pollicis, and those of the profundis digitorum, going to the index and middle fingers, were then freed from their dense adhesions, and laid again in their beds. The surfaces of these tendons after the dissection were very ragged. The wrist was put up in a flexed position upon a splint. The wound subsequently healed by first intention. Twenty-four hours after the operation the man was positive that he could feel on the palmar surface of his index finger, which was previously quite anæsthetic. Seven weeks later he left the hospital. He was then able to feel in all parts of the shaded area in the chart, although the sensation at the tips of the fingers was dull. There was

still reaction of degeneration in the muscles of the thumb supplied by the median. The movements of the thumb and first two fingers which had been limited by the adhesions around their flexor tendons were much improved.

A letter received from this man fourteen months later made it appear probable that there was again some definite, though much slighter, involvement of the nerve in scar tissue, as there were sensory symptoms in the area of its distribution. The tendons also had not remained quite free from adhesions.

Bullet Wounds of the Chest and Abdomen.

The following brief abstracts of cases of penetrating bullet wounds of the *Chest* illustrate some of the secondary effects of these injuries :—

Case 29.—Entry in front in second left intercostal space; exit behind, to left of ninth dorsal spine. History of hæmoptysis for first few days. On admission no symptoms; physical signs normal.

Case 30.—Wounded March 10th, 1900. Entry in front in fourth intercostal space, 3½ ins. to right of middle line; exit below angle of right scapula. No history of hæmoptysis. On April 25th there was still deficient movement of right side of chest, with impaired resonance, and weak breathing below the nipple line in front, and an inch below the spine of the scapula behind. A very little blood-stained serum was withdrawn with aspirator. There had probably been a hæmothorax.

Case 31.—Wounded March 31st, 1900. Entry on posterior aspect of left shoulder, bullet retained beneath skin of right groin. No history of hæmoptysis. On April 15th there was still some pain in left side of chest during deep breathing; physical signs normal. Case reported above (Case 2).

Case 32.—Wounded March 31st, 1900. Entry at junction of second left rib and cartilage; exit two inches below and external to angle of left scapula. No history of hæmoptysis. On April 12th there was impaired expansion of left side of chest, with diminished resonance, and local fremitus, and weak breath sounds at the left base; slight shortness of breath, and pain in the left side. On April 25th coarse friction was audible in the sixth and eighth spaces, in the mid-axillary line. Discharged on April 25th to Cape Town.

Case 33.—Wounded March 29th, 1900. Entry in anterior fold of left axilla; exit in middle line of back on level of spines of scapulæ. History of slight hæmoptysis for four days. On April 25th, 1900, there was impaired resonance, with diminished vocal fremitus, and weak breath sounds in the left side of the chest below a horizontal line drawn through the nipples; there were no symptoms.

Case 34.—Wounded May 29th, 1900. Entry over left eighth rib in mid axillary line; exit over left seventh costal cartilage. History of immediate free hæmoptysis, which continued in slight amount for two days. On June 15th slight friction was audible over point of entry; no symptoms.

Case 35.—Wounded June 12th, 1900. Entry over outer end of twelfth left rib; exit in fourth intercostal space, one inch above left nipple. History of slight hæmoptysis for nine days. 'Attack of pneumonia' set in on day after wound, and 'second attack' on July 29th, both on left side. Three months after wound there were no symptoms, and no abnormal physical signs.

Case 36.—Wounded August 21st, 1900. Entry in right sixth intercostal space in posterior

axillary line; exit below front of left iliac crest. No history of hæmoptysis; vomiting for four days; 'blood in urine' three days. On September 4th slight jaundice, signs of consolidation, and effusion at right base; temperature 104°, and remained irregular. On September 15th aspirator needle introduced upwards and backwards in tenth space, withdrew small quantity of creamy pus; part of tenth rib excised; pleura adherent, no further pus could be reached; diaphragm incised, but no pus below it; wound plugged. Temperature irregular till beginning of November, when free purulent expectoration occurred, and the temperature soon became normal. Left hospital quite well on December 30th.

Case 37.—Wounded October 20th, 1900. Entry behind and below angle of right scapula, over tenth intercostal space; exit over seventh left costal cartilage, 1¾ inches from middle line. No history of hæmoptysis; had 'blood in the urine.' On November 13th resonance was impaired, and breath sounds were weak at right base; temperature 100–101° for three days, then normal. Left hospital on December 7th; two pints of fluid were later aspirated from right pleura at Branch Hospital, Mackenzie's Farm.

Case 38.—Wounded February 20th, 1900. Entry in back, one inch to left of first dorsal spine; exit over left seventh rib, slightly in front of posterior axillary line. On March 20th there were no abnormal physical signs; pain in left shoulder. There was a history of hæmoptysis for several days.

Case 39.—Wounded May 17th, 1900. Entry over fifth right rib, one inch below pectoral fold; exit over fourth intercostal space, one inch from right border of sternum; the bullet had penetrated the right arm, fracturing the humerus, and injuring the musculo-spiral nerve. There was a history of immediate hæmoptysis. On June 21st there were no abnormal physical signs, and no chest symptoms.

Case 40.—Wounded August 9th. Entry over eighth intercostal space, two inches below and outside angle of left scapula; bullet retained, and subsequently localised embedded in substance of right lung, beneath the fifth and sixth costal cartilages: the nose of the bullet, which was directed downwards and slightly inwards, being 2½ ins. from the surface. History of slight hæmoptysis for several days. Right pleura had been tapped on August 25th or 27th, and 3½ pints of bloodstained fluid withdrawn. On August 29th a right-sided empyema had been opened and drained. On October 31st the patient was very thin and weak, the right side of the chest moved imperfectly, and the lower part was dull, with loss of vocal fremitus, and weak breath sounds; the incision below the angle of scapula had healed. On November 13th there was a profuse discharge of pus from the scar, and a tube was inserted. The patient was invalided home on January 8th, 1901, much improved; small tube still in right pleura. After reaching England, the wound healed soundly. On account of the position of the bullet in this case, deeply embedded in the substance of the lung, and the absence of any likely connection between its presence and the symptoms, no attempt was made to extract it, a decision which the subsequent course of the case seemed to justify.

The great interest of bullet wounds of the *Abdomen* is concerned chiefly with the important question of immediate operation as opposed to the expectant treatment. If the wounded man recover from the immediate dangers of the wound, the chance of the supervention of later complications is, unlike wounds of the chest, small, and the cases which came under our care merely presented healing or healed wounds of the abdominal wall, with complete absence of any evidence of injury to the viscera, although in several cases the course of the bullet was

such that it may be considered as certain that intestinal coils and other viscera had been penetrated.

Bullet Wounds of the Brain.

The only cases of bullet wound of the brain which deserve record are the following:—

Case 41. *Bullet Wound of Head: Perforation of Occipital Lobes.*—Gunner A., aged 26, admitted into hospital May 24th, 1900, was wounded on May 5th, the range unknown, by a Mauser bullet,

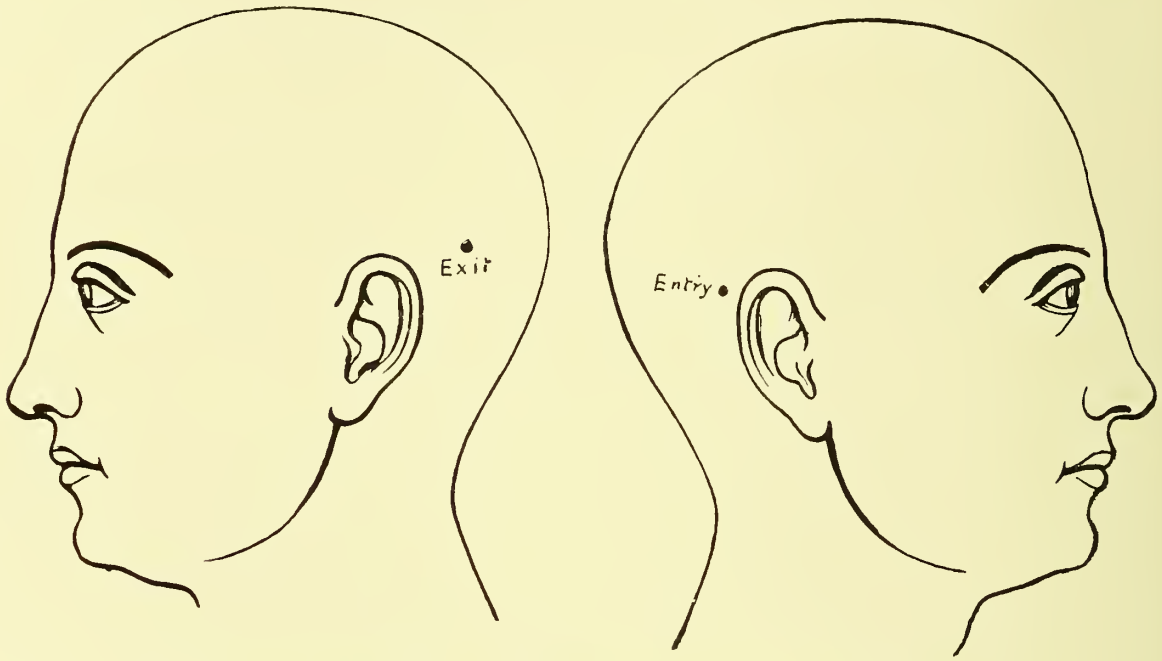


Fig. 15.—Bullet wound of head: perforation of occipital lobes (case 41).

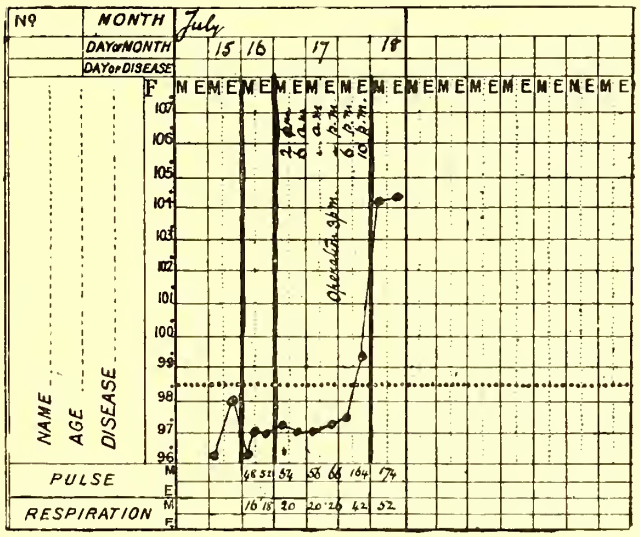
through the back of the head while standing. He felt a 'ringing sensation' in his head, and though being very giddy did not fall, but walked unassisted fifty yards to the ambulance, where he was dressed. He then travelled three days in a bullock-wagon to Bloemfontein. The second dressing took place in the wagon on the day after the wound was received. He was not sick after the injury. He had no headache. No pieces of bone came away and the wounds rapidly healed. Upon trying to read during the first two days after the injury he noticed that the letters appeared to run together, but on admission his eyesight seemed to be as good as before he was wounded.

Upon admission on May 24th the wounds had healed, and the patient expressed himself as feeling quite well, though he suffered from occasional occipital headache, but no nausea or giddiness.

Entry: on the right side of the head above and behind the auricle $1\frac{1}{2}$ inches above Reid's base-line and $\frac{3}{4}$ inch behind the line of the reflection of the skin of the auricle on to the mastoid process. There was a slight bony depression immediately under the scar of entry. Exit: on the left side of the occiput $\frac{3}{4}$ inch above the level of entry $1\frac{1}{2}$ inches from the middle line and $2\frac{3}{4}$ inches from the external occipital protuberance (fig. 15).

He was sent to Cape Town in a fortnight, and after reaching England Mr. Cargill examined him, and reported that vision was normal and that there was no contraction in the field.

Case 42. *Bullet Wound of Head. Cerebral Abscess.*—Trooper C., aged 30, was admitted into hospital July 15th, 1900, having been wounded three months previously on the right side of the head by a Mauser bullet. Upon admission the man was in such a drowsy state that it was impossible to obtain a connected account of his injury from him, although he would answer an occasional question. Hence the history had to be obtained from the men of his own regiment who were with him during the engagement and had themselves been invalided to the Yeomanry Hospital. It appeared that he had been wounded whilst riding, that he at once fell forward on his horse's neck, but was soon helped to dismount by his comrades. The next day he was taken to a temporary hospital. His comrades were positive that when they saw him ten days after the receipt



TEMPERATURE CHART OF CASE 42.

of the wound the left arm and leg were completely paralysed, but they were unable to give definite information concerning the left side of the face.

When admitted into the Yeomanry Hospital three months later, the man was in a very apathetic and drowsy condition. He lay on his back in bed without retraction of the head, answered simple questions, but took a long time to do so, complained of headache in the frontal and occipital regions, called to the nurse when wanting a drink, but passed urine and fæces into the bed. The temperature was subnormal, the face pale, the tongue very furred, and the breath foul. There was no squint, the pupils were equal, not dilated, and reacted readily to light. He was not sick. The left side of the face was partially paralysed, but the upper half moved better than the lower. The left arm and leg were completely paralysed. The left forearm was kept across the chest, and any attempt to move the joints of the limb was strongly resented; they seemed stiff, and any movement caused much pain.

The left leg lay extended in bed powerless, the knee jerk was exaggerated, and the rectus jerk present, but there was no ankle clonus, and no plantar reflex. The right arm and leg moved naturally, but the right knee jerk was more exaggerated than the left, and the rectus jerk easily

obtained. There was no ankle clonus. The left side of the body was not anæsthetic, a pinch or a pin-prick rousing the patient at once.

There was a typical Mauser bullet scar $\frac{3}{8}$ inch in diameter on the right half of the forehead, $\frac{1}{2}$ inch from the middle line, and 1 inch vertically above the inner end of the right eyebrow. The bone was slightly depressed beneath it. It was obviously the scar of entry. The exit scar was situated in the right occipital region at a point 2 inches along a line drawn from the external occipital protuberance upwards and outwards to the right parietal eminence. The bone was felt to be irregularly fractured over an area 1 inch in diameter under the exit wound. Both wounds had long since

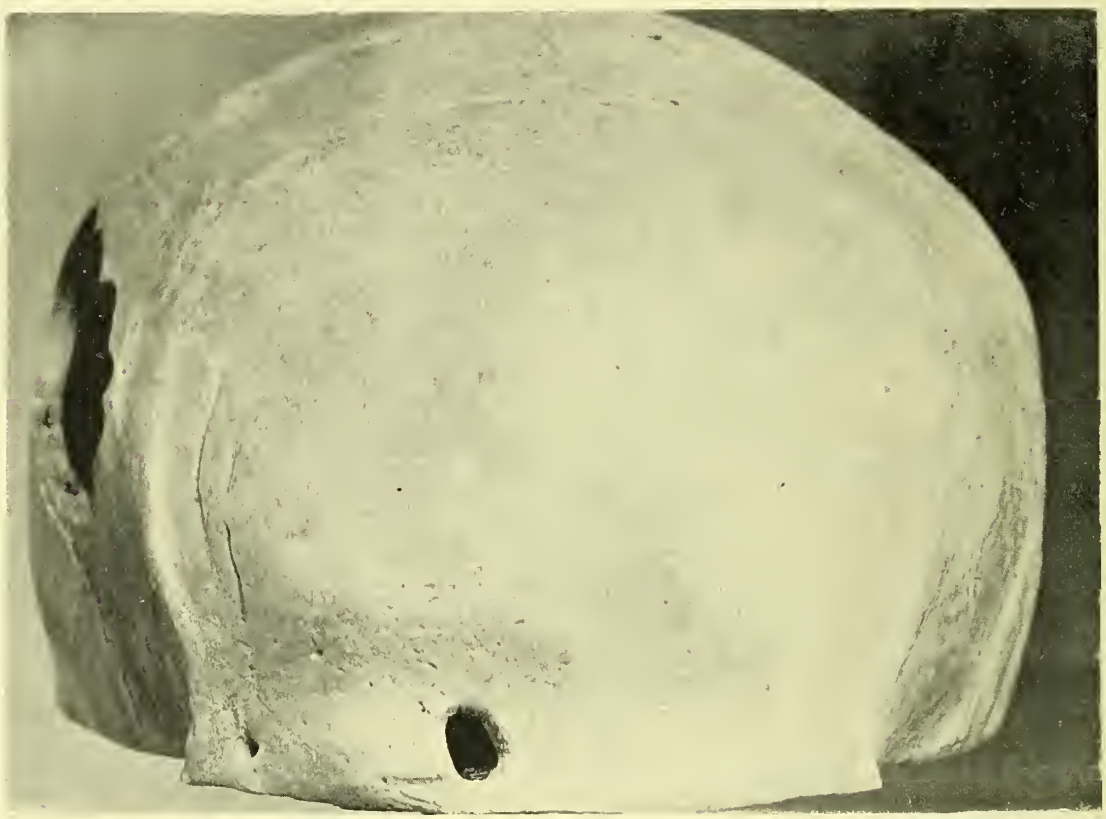


FIG. 16.—BULLET WOUND OF SKULL: APERTURE ON ENTRY (CASE 42).

healed. The next day the man became distinctly more drowsy, the temperature was 97, the pulse 48, respiration 16. The head was generally kept turned to the right, an external squint developed in the right eye, and the eyeballs tended to roll to the right. The right pupil was dilated, but just reacted to a strong light; the left was normal.

The ophthalmic surgeon, Mr. Vernon Cargill, reported that optic neuritis was commencing in both eyes. The left facial paralysis was more evident. The next day he was in much the same condition, but Mr. Cargill reported that the optic neuritis was more advanced in the right eye than the left. Operation was no longer delayed.

The position of the lower end of the furrow of Rolando was first estimated on the right side of the head, and this point marked on the skull by a sharp instrument driven through the soft parts covering it. A semi-circular flap of all the parts down to the bone, with this point as a centre, was

then turned down. The pin of an inch trephine was placed immediately above the point marked on the skull, so that the lower cutting margin of the trephine passed through it. Upon removing the disc of bone the dura mater felt tense and did not pulsate. It was incised, and the brain at once bulged into the opening. A pair of sinus forceps was put in horizontally for 1½ inches, then forwards and inwards nearly to the frontal bone without result. A direction upwards and inwards was then tried, and lastly backwards and inwards for 4 inches, when thick yellow pus was evacuated after a little resistance to the forceps, due to the wall of the abscess cavity, had been overcome. Another disc of bone was taken away behind the first and the two openings thrown into one. The

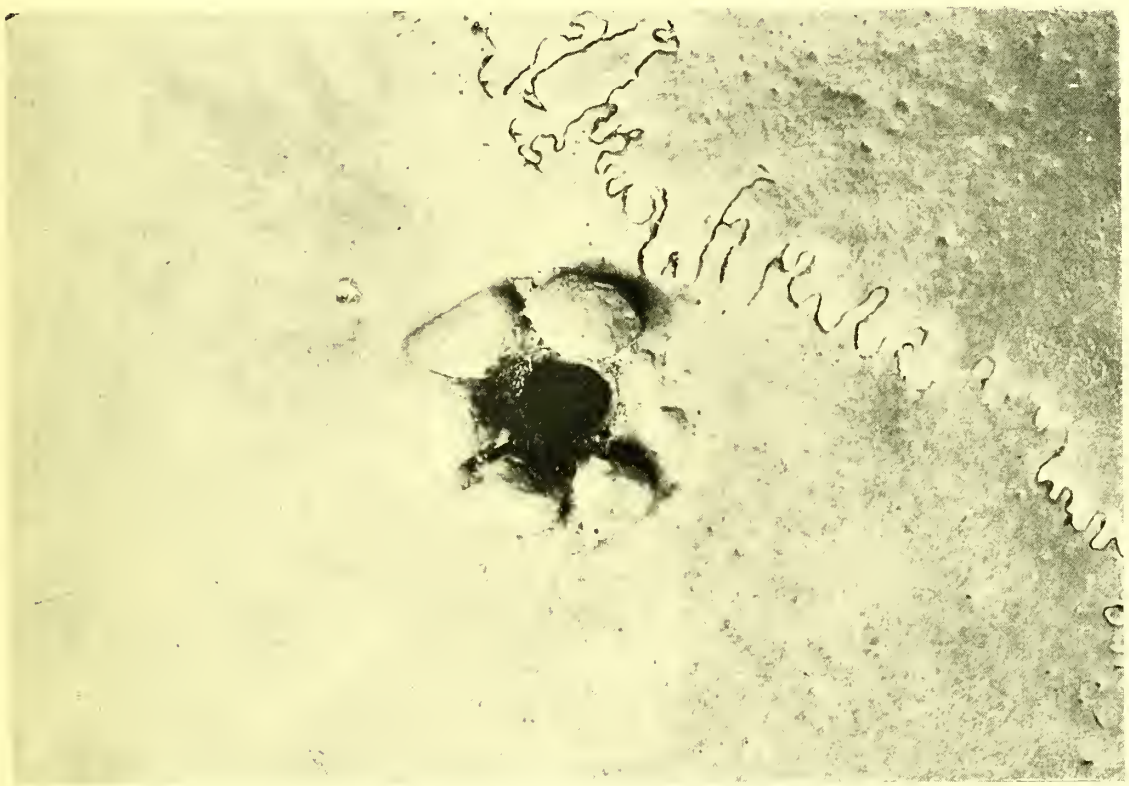


FIG. 17.—BULLET WOUND OF SKULL: APERTURE OF EXIT (CASE 42).
(This photograph is on a larger scale than Fig. 16.)

forceps reinserted in the posterior part of this opening again entered the abscess at a depth of about 2½ inches, and four to six drachms of yellow, inodorous pus were evacuated. A rubber drainage tube was inserted. The pulse rose to 80 at the end of the operation. The patient never recovered consciousness after the operation; the pulse became more rapid until it was uncountable, the respiration became of the Cheyne-Stokes type, and death occurred eighteen hours later, the temperature in the axilla rising shortly before death to 104·4°.

Autopsy, four hours after death.—*Aperture of entry*, in the right half of the frontal bone, ¼ inch in diameter, ½ inch to the right of the middle line, and just above the inner extremity of the right supercilliary ridge (fig. 16). Both internal and external tables were bevelled down to the central circular aperture. The upper part of the frontal sinus was laid open. *Aperture of exit*, in posterior part of right parietal, ¼ inch in diameter, its centre ¾ inch in front of the right half

of the lambdoid suture, and two inches distant from the lambda. The inner table was bevelled off to the central aperture, as in the case of the wound of entry; but the external table had been fissured in a radiate manner, and small triangular pieces of bone had been split off, but had united again round the exit wound, so as to produce a kind of rosette, the diameter of which was $\frac{3}{4}$ inch (fig. 17). The oval opening made in the skull at the operation measured $2\frac{1}{2}$ inches in length and $1\frac{1}{8}$ inches vertically (fig. 18).

The character and situation of the various openings in the skull can be seen from the photographs of the calvaria. The direction of the bullet track is indicated by the piece of wire passing through entry and exit.

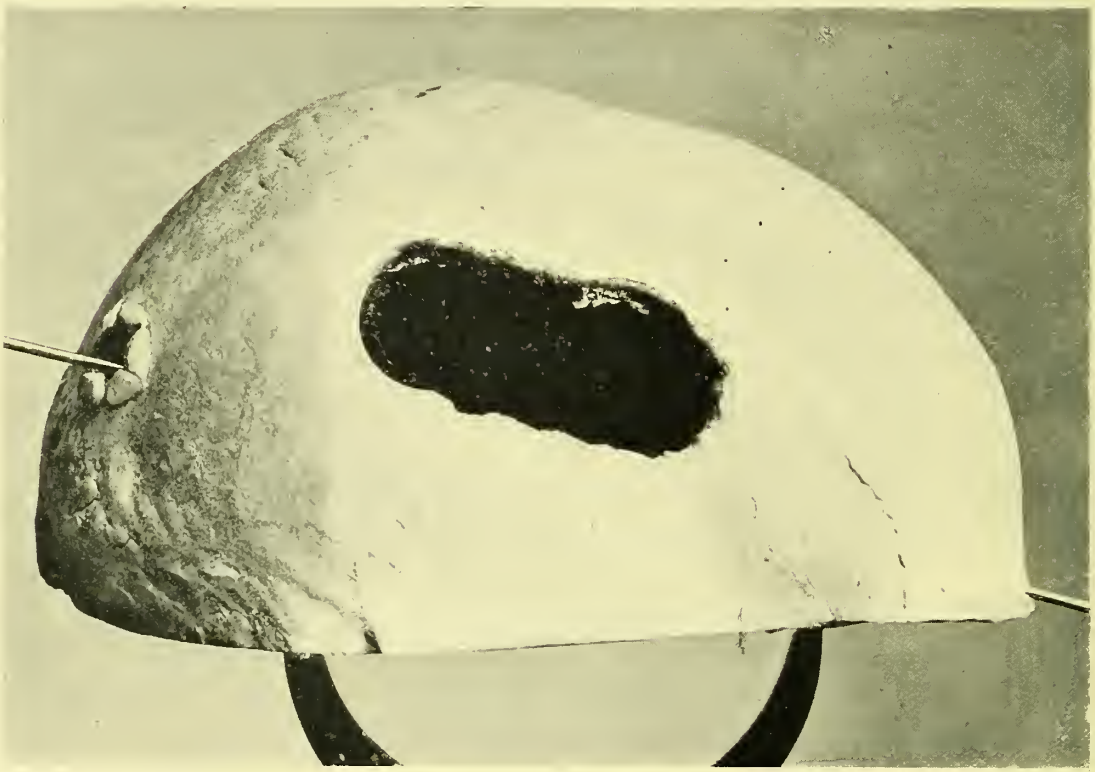


FIG. 18.—BULLET WOUND OF SKULL, SHOWING OPENING MADE IN OPERATION FOR CEREBRAL ABSCESS (CASE 42).

The part of the cerebral cortex exposed at the operation lay wholly above the posterior limb of the Sylvian fissure. It comprised the lower parts of the ascending frontal and ascending parietal convolutions, and some of the parietal lobe immediately behind the latter. (Fig. 19.)

In exposing the brain, it was found to be adherent to the dura at the entry wound, and there were a few fragments of bone, in size not larger than $\frac{1}{8}$ inch in diameter, embedded superficially in the cortex. There were also adhesions around the exit wound, and in addition, over a circular area 2 inches in diameter, at the upper part of the parietal lobe, extending to within $\frac{1}{2}$ inch of the superior longitudinal sinus. In separating the dura from the brain in this last situation a mass of cerebral substance, mixed with inflammatory products, circular in shape, quite 1 inch in thickness and 2 inches across, was left adherent to the dura mater. Upon incising this mass an abscess

cavity ¾ inch in diameter was opened. It contained pus similar to that seen at the operation, and possessed well-defined walls. The longitudinal sinus was not thrombosed.

In a horizontal section of the right cerebral hemisphere, no hæmorrhages were seen to mark the track of the bullet, but in the region of the genu of the internal capsule, distinct white softening was evident, though its limits were difficult to define. In the centre of the white substance of the occipital lobe was the abscess cavity, 1½ inches in diameter, which had been drained at the operation. To the outer side of this was a smaller unopened abscess, 1 inch in diameter. It was situated immediately beneath the cortex of the lower and posterior part of the right parietal lobe. The drainage tube passed just beneath the cavity, and it contained the same kind of pus as the one that had been tapped. The right lateral ventricle contained pus; the left did not. The rest of the brain was healthy. Neither the chest nor the abdomen were opened.

Remarks.—The general signs pointing to an abscess in this case were well marked, but the localisation was very difficult. The paralysis of the arm and leg did not assist, as it dated from the time of the injury, and was apparently due to direct destruction of the conducting paths by the bullet, as was proved at the post-mortem examination. Other signs seemed to point to the abscess being situated in the anterior rather than the posterior part of the brain. The uncertainty decided us to expose the lateral aspect of the hemisphere near its centre, instead of either extremity.

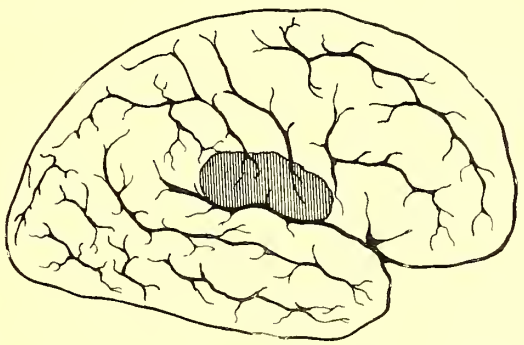


FIG. 19.—DIAGRAM SHOWING THE AREA OF THE CEREBRAL CORTEX EXPOSED IN THE OPERATION FOR A CEREBRAL ABSCESS AFTER BULLET WOUND (CASE 42).

The direct cause of death was probably the infection of the lateral ventricle by the pus from the abscess cavity, the ventricle having been opened in the search for pus. This was much to be regretted, but even if this had not occurred, it must be remembered that the man had two other abscesses in his brain which would seriously have endangered his life, supposing that the largest one had been satisfactorily drained and cured. No foreign body was found in any of the abscess cavities. An agar tube, inoculated with the pus at the time of operation, grew a pure culture of the staphylococcus pyogenes aureus.

Shell Wounds.

Very few cases of shell wound came under our care, and of these the majority displayed no special features of surgical interest, being merely suppurating lacerated wounds of the soft parts.

Case 43. *Shell Wound of Hip.*—The most severe case of shell wound that we saw was that of an officer who was admitted fourteen days after being struck on the left hip by a 9-lb. shell. He was standing at the time, and the shell hit him before it exploded. The sensation was that of a tremendously heavy blow, and the shock was so severe that he did not hear the explosion which took place about ten feet behind him. He staggered a yard or two and then fell. According to his statement there was not much hæmorrhage at the time, but there was very considerable loss of blood during a twelve miles ride in an ambulance waggon which he took on the day he received his wound. Upon admission there was an extensive suppurating wound of the left hip, extending

from a point 2 inches in front of the great trochanter backwards for 10 inches on to the buttock, so that when in the dorsal position in bed, he was resting on the posterior part of the wound. The measurement of the granulating surface from above down was 5 inches. The trochanter and upper part of the shaft of the femur were exposed in the wound extensively splintered and bathed in pus. The left thigh was kept flexed, adducted, and rotated in. After a very prolonged and trying period with the use of weight extension and the removal of necrosed and carious bone under chloroform, the patient made a good recovery, and seven months after the receipt of his wound was walking about on crutches, with the wound almost healed, with firm bony union of the femur, and with not more than half an inch of shortening.

In the following cases a shrapnel bullet or fragment of shell was localised by radiography and extracted :—

Case 44. *Shrapnel Bullet Wound of Chest.*—Trooper D. was admitted into hospital June 8th, 1900, having been wounded two months previously by a bullet from a shrapnel shell which burst 80–90 yards above him. He was stooping in a trench at the time, and the bullet entered his back and knocked him over. He stated that it felt 'like a bit of warm iron being run into him.' He got up at once and walked 1000 yards to the dressing station. He brought up a streak of blood directly after he was hit, and about an hour later coughed up a teacupful. Hæmoptysis continued for eight or nine days. The wound was healed in a fortnight. For the last two weeks he had had considerable aching pain in the region of the right breast, increased by moving the arm away from the side. Upon admission, an oval scar of entry, $\frac{3}{4}$ inch long, was seen a quarter of an inch to the right of the middle line of the back on a level with the sixth or seventh dorsal spine. There was no exit scar. The breath sounds over the right lung were normal.

Upon the fluorescent screen a spherical bullet was seen on a level with the sixth right rib at the front of the chest in the nipple line. It was immediately below the level of the arch of the diaphragm on that side, but when the diaphragm descended in inspiration the bullet remained stationary above it Localisation showed it to be exactly under the sixth rib, at a depth of $1\frac{1}{4}$ inches from the surface of the skin, and $1\frac{1}{4}$ inches below and $\frac{1}{2}$ inch to the inner side of the centre of the right nipple (fig. 20). At the operation $1\frac{1}{2}$ inches of the sixth rib were removed over the situation of the bullet, but the pleura was accidentally punctured in doing so. As the bullet was not immediately detected, a similar length of the fifth rib was also removed, and then the foreign body could be felt by the finger in the space left by removing the portion of the sixth rib. It did not move up and down with respiration, but appeared to approach and recede from the finger with inspiration and expiration respectively. As a considerable amount of air had entered the right pleural cavity it was decided to postpone the removal of the bullet for a few days to enable adhesions to form between the parietal and pulmonic pleuræ. The wound was partly sewn up and partly plugged with gauze.

Twelve days later, after some dyspnœa and a rise of temperature due to the last operation had subsided, the wound was explored, the parietal pleura incised and separated from the pulmonic for an area about $1\frac{1}{2}$ inches in diameter. Well-marked adhesions between the two layers had formed during the interval. The bullet was detected embedded in the superficial part of the lung. The capsule surrounding it was divided, and the bullet extracted. The general pleural cavity was not opened during the operation. The foreign body proved to be one half of a shrapnel bullet which had split upon striking some cartridges in the man's bandolier. Healing was delayed owing to some necrosis that occurred in the sixth costal cartilage, but when the patient left for Cape Town two months later the wound had almost closed.

Case 45. *Shrapnel Bullet Wound of Left Hip.*—Pte. S. was admitted into hospital on

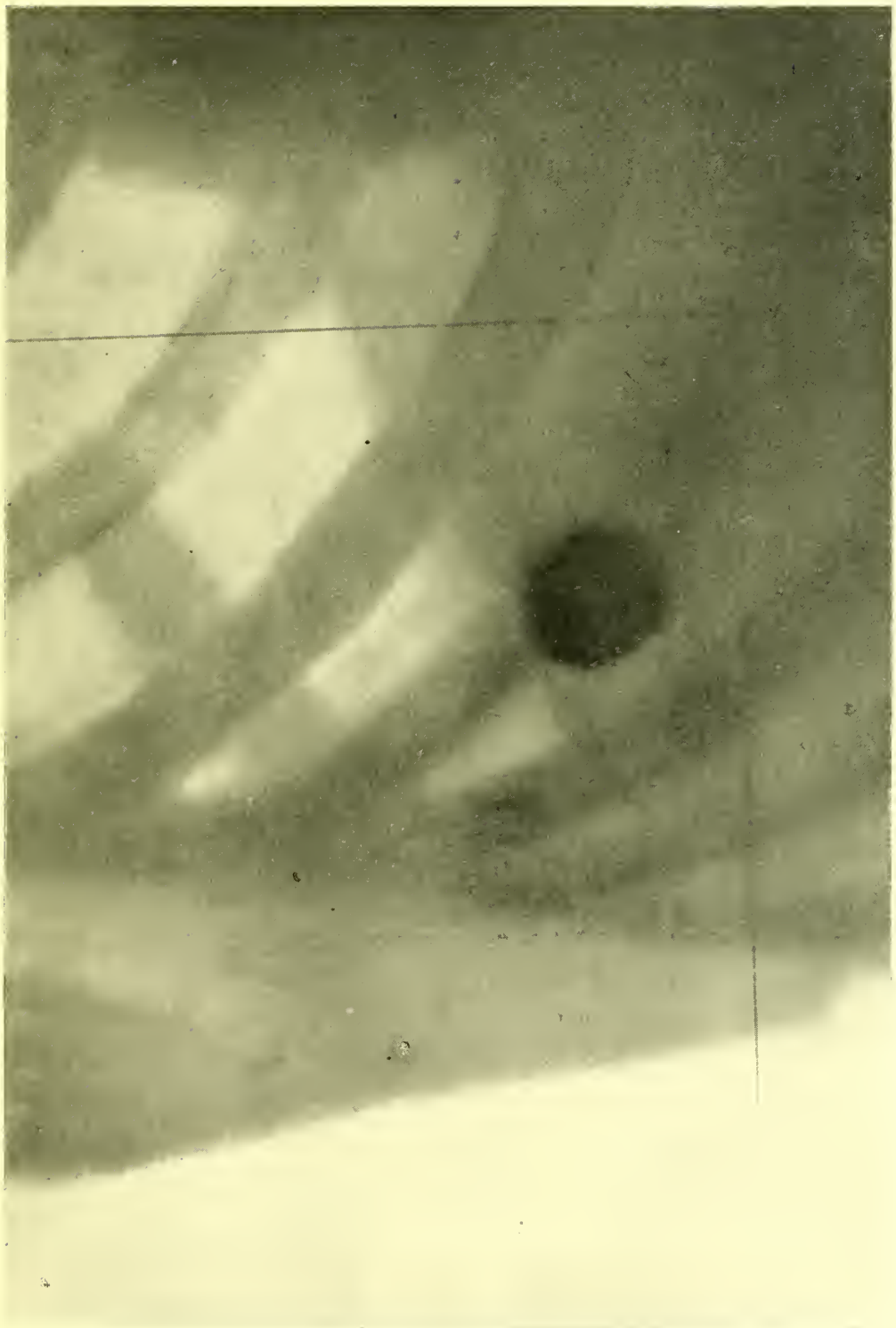


FIG. 20.—SHRAPNEL BULLET IN CHEST (CASE 44).
(Skiagram by Mr. J. Hall-Edwards.)

July 6th, 1900, having been wounded thirteen days previously by the bursting of a shrapnel shell on his left. His distance from the explosion he could not tell, but the blow was sufficient to knock him down. Upon admission there was seen a circular aperture $\frac{1}{2}$ inch in diameter, in the skin over the left great trochanter and 2 inches below its upper margin. It was discharging pus freely and led downwards and inwards for a distance of 2 inches, when the probe was stopped by a hard substance. There was much tenderness below the wound and at the upper and inner part of the thigh. Both the hip and the knee were kept slightly flexed, and the patient strongly resisted any attempt to move them beyond about 15° in either direction.

Six days after admission the wound was explored under chloroform, and a track $\frac{1}{2}$ inch in diameter was traced into the substance of the great trochanter, and at a depth of $1\frac{1}{2}$ inches within the bone a somewhat deformed shrapnel bullet was found and extracted. The bullet appeared to be a ricochet. An abscess cavity holding 3-4 ounces of pus was opened in the intermuscular planes in front of the great trochanter. The patient made a good recovery, and the limitation in movement of the hip and knee eventually disappeared.

Case 46. *Shell Wounds of Back and Thigh.*—Pte. E. was admitted into hospital August 31st, 1900, having been wounded six days previously owing to the bursting of a shrapnel shell. Upon admission there were found to be eight or nine lacerated wounds upon the back, left buttock, and left thigh. The majority were superficial, not penetrating more deeply than the superficial muscular layer. The sinuses were enlarged under anæsthesia, and pieces of shell removed from certain of them. In eleven weeks all the wounds had healed except one over the outer aspect of the left great trochanter, which still suppurated freely. The hip was skiagraphed, and on a level with the upper part of the trochanter was seen a triangular fragment of metal. This was stated to be at a depth of $4\frac{1}{4}$ inches from the surface of the skin of the buttock. It was impossible to state before the operation whether this fragment would be found in the soft parts in front of the trochanter or in the bone itself. The sinus on the outer aspect of the hip was enlarged, and the regions in front of and behind the trochanter were explored with negative result. A minute track, just admitting a probe, was subsequently detected leading into the bone. This was enlarged, and the foreign body, which proved to be a portion of the iron case of a shrapnel shell, was found at a depth of $1\frac{1}{2}$ inches within the substance of the bone at the anterior and upper part of the great trochanter. The patient made a speedy recovery.

Civil Surgery.—We feel that the addition to these 'Notes' of any details of the ordinary surgical cases which came under our care would serve no useful purpose.

Among the cases of this class were a considerable number of hernia, hæmorrhoids, and varicose veins.

Operation was also necessary in several cases of acute appendicitis and for the treatment of mastoiditis, complicating chronic suppuration in the middle ear. A mulberry calculus, weighing 300 grains, was removed by cystotomy from a soldier who had gone through several actions in the early part of the campaign.

NOTES ON THE OPHTHALMIC DEPARTMENT.

BY

L. VERNON CARGILL, F.R.C.S.

Assistant Ophthalmic Surgeon to King's College Hospital; Surgeon to the Royal Eye Hospital; and Ophthalmic Surgeon to the Seamen's Hospitals Society.

The department was fully equipped for the efficient treatment of eye diseases and injuries. It was provided with a complete set of operating instruments; a supply of sterilised dressings in air-tight tins, an electro-magnet, trial lenses, test-types and other appliances for examination and testing, all requisite drugs, and spectacles, goggles and shades.

Defective Vision.

Amongst the cases sent into hospital on account of defective vision there were some who had undoubtedly been admitted into the service with insufficient eyesight to enable them honestly to pass the required visual tests. The majority of these belonged to corps which had been more or less hastily raised for the war, and in their case, it can be understood how the need for men on the one hand and the intensely enthusiastic and patriotic desire to serve in South Africa on the other hand may have led to recruits squeezing through the visual tests when they ought, according to the regulations, to have been rejected. This should not be possible, for such men cannot be a source of strength to their comrades, and if multiplied they might easily become a source of danger. For, seeing that success in modern warfare largely depends on accurate rifle-fire at ranges varying from an extreme of about 2000 down to within 200 yards, the inaccuracy of fire of a certain percentage of a force might culminate in disaster to the whole; whilst a relatively small body of keen-sighted marksmen trained to take rapid aim might secure most important results. In scouting and picketing work defective eyesight might be particularly disastrous. Further, men with defective vision may very soon have to be invalided home from active service on account of their eyes becoming troublesome, and thus they are a leakage in the effective strength in times of need, as well as a source of pecuniary loss to the nation. To obtain the advantages accruing from the use of smokeless powder and modern rifles and guns, with their longer range and greater precision, good vision is necessary in order to ensure accuracy of aim. The War Office test can be passed by a recruit having only $\frac{6}{24}$ of vision in each eye, and it is questionable whether that even is enough for the necessities of modern warfare. It will pass a

myope of 2 D., and a hypermetrope of high degree, even with considerable astigmatism ; and it will pass cases of serious ocular disease.

The testing of recruits should, without exception, be conducted by a medical officer, and never be relegated to a non-commissioned officer, as *it apparently* had been in some cases met with. A medical officer who has had special ophthalmic training should, if possible, be selected in order to ensure an efficient carrying out of the regulations and a proper discretion in the sifting out of unsuitable cases of morbid ocular conditions. The authorities are to be congratulated on a recent Army Order by which the wearing of glasses on or off duty is permitted, and they might go further and demand, in addition to the present requirements, a higher standard of visual acuity with the aid of glasses if it is unobtainable without, the accommodation to be sufficiently good and the error of refraction not too high—not more than 2 D. of myopia, and not more than 4 D. or 5 D. of hypermetropia. The wearing of spectacles on parade is probably a long way off in the British Army, but their use, where required, might be insisted on for shooting, in order that the best possible marksmanship might be attainable. That intelligent men can carry and use spectacles on active service, and that they may be trusted to take every care of them when they realise the advantage in accurate shooting which they afford, an accuracy on which so much may depend, has been proved in the case of yeomen in the present war. With regard to the question of accommodation, it must be remembered that the back-sight of a Lee-Metford rifle is about 40 cm. from the aiming eye, and the fore-sight about 100 cm., so that to focus the former an emmetrope would require 2·5 D. of accommodation, and for the latter 1 D. of accommodation. Thus, in using his rifle, a soldier is continually varying his accommodation to these amounts, and that often in glaring sunlight, which may be directed towards his eyes with a tendency to excite irritation and hyperæmia, especially in cases of uncorrected ametropia.

There were men with hypermetropia and hypermetropic astigmatism whose sight had been satisfactory until they were attacked with gastro-enteritis, dysentery, enteric fever, or acute rheumatism, when their previously active and compensating accommodation failed to a greater or less degree with the result that in some cases they had to be invalided home on that account alone. Now that glasses are allowed, such men could be, if provided with them, retained on the lines of communication or at the base, instead of being sent home.

To give a few instances of men who would have been rejected for active service in South Africa if their eyes and sight had been conscientiously examined in accordance with the regulations I may mention the following cases :—

A Yeoman who had in each eye numerous posterior synechiæ, and old disseminated choroiditis, with floating vitreous opacities and deposits on the back of the corneæ and anterior capsules.

R.V. $=\frac{6}{60}$ barely; L.V. $=\frac{6}{24}$. He had no sooner reached the front that he had to be sent down and invalided home.

A Yeoman with R.V. $=\frac{6}{36}$ partly, unimproved by spheres (mixed astigmatism); left eye amblyopic with internal squint and with V. less than $\frac{6}{60}$ (it had been tenotomised when he was a child).

A Yeoman with R.V. $=\frac{6}{18}$ partly (compound hypermetropic astigmatism); and L.V. = only Jaeger 20, with old internal squint.

A Yeoman whose right eye had always been defective, with constant suffering from headaches and asthenopia. R.V. not $\frac{6}{60}$; hypermetropia with 3·50 D. of astigmatism. Left eye also astigmatic.

A Trooper in the Victorian Mounted Rifles, who was sent into hospital with iritis in his left cataractous, blind, and microphthalmic eye.

A Trooper in the Ceylon Mounted Infantry, whose right eye had been affected in Ceylon two years before. The cornea was diffusely leucomatous and partially tatooed, and the iris barely visible. He was sent into hospital with right ciliary injection, T + 1, and bare perception of light. The left eye was injected, photophobic, and painful; but it soon recovered on enucleation of the right.

A Private in the Royal Irish Rifles who had internal squint in the right eye, with V $=\frac{6}{36}$, unimproved by lenses. L.V. $=\frac{6}{12}$ partly. Compound hypermetropic astigmatism in each eye. He said that he had been rejected twice in consequence of the defective sight in his right eye. He offered himself a third time, and was tested by a sergeant, who passed him, although he maintains that he was not accurate in counting the dots. He had never passed his course at the ranges satisfactorily. His shots always went well to the left, and he could never even hit the target at a greater distance than 200 yards. When shooting, he places his rifle to his right shoulder, but he closes his right eye and sights with the left, getting the foresight and the object into line with the left eye. This man had been in action.

A Trooper with R.V. less than $\frac{6}{60}$, but improved by the correction of his 5 D. of hypermetropic astigmatism to $\frac{6}{36}$ partly. L.V. $\frac{6}{18}$, with the recorrection of 3·50 D. of hypermetropic astigmatism. He passed at the ranges up to 300 yards, but he thinks that it was only by chance.

Gunshot Wounds Implicating the Eyes.

I read a paper on the Ophthalmic Conditions Resulting from Modern Gunshot Wounds at the Cheltenham meeting of the British Medical Association (1901), in which I classified and embodied my experiences, exhibited specimens, and referred to cases. The percentage of cases of gunshot wounds in which the eyes were implicated admitted into the Deelfontein Hospital would naturally be considerably higher than would obtain for the total number throughout the campaign, since many cases were specially sent for the ophthalmic department. In the majority of cases in which the eyeballs and their adnexa were injured by gunshot wounds the orbits were implicated. The orbital cavities were traversed by the bullet, or the orbital walls were perforated, fissured, or comminuted, or the orbital margins were notched. In nearly all cases where a bullet traverses an orbit the eyeball will be injured either directly by contusion, rupture, or perforation and

disorganization, or indirectly by vibratory concussion. If, in consequence of the bullet passing near the apex of the orbit, the globe should escape, then the optic nerve will almost certainly be injured. The results as regards vision are usually very serious. Immediate blindness is generally produced, and, if it does not begin to pass away in a few hours, severe structural damage is probably present, and permanent blindness will probably result. There may be some return of vision after the immediate effects of concussion have passed off, and yet changes may ensue which cause later permanent visual defect, or even total loss. If the eyeball has suffered vibratory concussion, pigmentary degenerative fundus changes may follow. In other cases of concussion, and more especially of contusion, there will be hæmorrhage, often copious, into the vitreous, retina, choroid, or even anterior chamber, with choroidal rupture, or even retinal detachment. This may be followed by choroido-retinitis with considerable effusion, giving rise to the appearance of retinitis proliferans. Retinal detachment is not commonly seen later, as the plastic choroido-retinitis which ensues unites these two membranes together. A posterior rupture of the globe is evidenced by very low tension or complete flaccidity, and the anterior part of the globe may be wrinkled. A later sequel, where the orbit has been considerably damaged, is enophthalmos.

If the optic nerve has suffered indirectly from vibratory concussion, it may either recover or degenerative changes may ensue. If it has been contused or bruised by the bullet grazing it, atrophy will be the most probable result; and, of course, if it has been completely divided or lacerated, the case as regards vision is hopeless. Where the eyeball has escaped, injury to the optic nerve will be evidenced by very impaired or absent pupillary light reflex. Division of the nerve from ten to twenty mm. behind the globe produces the clinical appearances of embolism of the arteria centralis retinæ, but in gunshot cases such an injury would be complicated by contusion of the back of the globe. Considerable hæmorrhage into the sheath may produce constriction of the retinal arteries, distension of the retinal veins and scattered hæmorrhages; but in most cases of nerve injury the fundus shows no change at first, it being only after an interval of a few weeks that the optic disc assumes the pallor of atrophy. In some cases of concussion or bruising this may be preceded by a certain amount of neuritis. Copious hæmorrhage into the orbit, accompanied by proptosis, may cause a temporary impairment of vision, which may not come on instantly after the injury.

The extra-ocular muscles may be contused, or partially or completely divided. Division of posterior ciliary arteries is probably evidenced by the subsequent development of patches of pigmentation in the fundus.

The most serious direction for the bullet to pass through the orbit is transversely, since the sight of both eyes will probably be destroyed from both orbits

being traversed, as occurred in one case where the eyes were perforated and disorganized. Horizontal gunshot wounds of the orbits are generally received when standing, kneeling, or advancing, whereas the vertical wounds are generally received when lying down firing at the enemy. The following cases form good illustrations of the effects of gunshot wounds implicating the orbits:—

A Highlander was charging a kopje when a bullet from a range of about 200 yards grazed his nose and the infra-orbital margin on the right side. He fell on his knees and could not see with the eye for a few hours; then the perception of light returned, but the vision remained bad for some days before it gradually improved. In forty days the pupil, from being sluggish, almost regained its normal activity; the contraction of the visual field diminished; the blurring of the right optic disc cleared up almost completely, and the visual acuity became $\frac{6}{9}$ and J. 1.

A Private in the Grenadier Guards was wounded by a Mauser bullet, at a range of about 500 yards. It entered $2\frac{1}{2}$ inches above the glabella, and $1\frac{1}{2}$ inches to the left of the middle line, just within the hairy scalp. The exit was between the right external canthus, and the right external angular process. The bullet had then passed through the middle of the right arm, the entry being in front and higher than the exit, which was behind. At the time he was struck he was firing in the prone position. He felt as though he was being carried up into the air, and lost consciousness for a few moments. The right eyelids became very ecchymotic and swollen, and he had severe headaches for the next fortnight. There was bare perception of light in the right eye, and there were hæmorrhages in the choroid, retina, and vitreous, and neuro-retinitis developed. Two months later there were tracts of choroidal atrophy, with considerable pigmentation; a densely white radiating scar at the macula, with some remains of hæmorrhage in the vicinity; a pale disc with fluffy margins and surrounding retinal haze, and several vitreous opacities. He could count fingers at two or three feet, but only in parts of the field to the outer side. The ocular movements were normal. The left eye was unaffected. In this case the bullet must have grazed the back of the right eyeball to the outer side.

Mr. William Turner asked me to look at a Corporal who had come under his care a month after he had been wounded by a Mauser bullet at Paardeberg. Entry had been at the outer edge of the left orbit, just behind the external canthus; and the exit remained as an open, very septic wound, half-inch in front of the right tragus, and half-inch above the zygoma. He had complete anæsthesia of the right side of the face, except over the masseter, and paralysis of the right external pterygoid. In the right eye there was no adduction, and but slight elevation and depression, whilst abduction was unimpaired. There was anæsthesia of the surface of the eyeball. Pupil, 6–7 mm. diameter, circular, but reacting to light only faintly; no consensual reflex. Visual acuity:—J. 16. Tn Media clear. Subsiding optic neuritis. Field contracted. In the left eye all movements, except adduction, were much impaired, and there was enophthalmos. Still remains of extensive ecchymosis around the cornea and over an extensive area on the outer side. Pupil same size as fellow, but oval. Slight consensual reflex, but no direct reflex. No perception of light. T—1 fully. Extensive hæmorrhages and effusion projecting forwards and partly filling the vitreous chamber.

Three months later the anæsthesia of the 5th nerve was gone, and the external pterygoid was acting. In the right eye the movements were normal; the pupil central, circular, 3·5 mm. diameter, reacting to accommodation, but not actively to light. Visual acuity:—$\frac{6}{6}$ partly, and J. 1. at from four inches to a foot. Disc margins slightly woolly. Field

for white only slightly contracted. In the left eye there was external strabismus, and yet scarcely any power of further abduction; very defective elevation and depression, but adduction unimpaired. There was enophthalmos as before. Pupil 5 mm. diameter, oval and excentric, inactive to light but reacting with accommodation. No light perception. T—1. Numerous filmy and shreddy vitreous opacities. An extensive densely glancing-white area of atrophy and organized effusion embracing the disc on the inner side, and extending outwards more than half-way to the periphery, and upwards and downwards nearly half-way. The branches of the retinal vessels, the arteries small and the veins relatively large, are tortuous and irregularly distributed, and they emerge from the patch at various isolated points, the disc being unrecognisably concealed in the mass of organized exudation. Some of the vessels come forward very decidedly on emergence before passing to the periphery, and one branch comes directly forwards into the vitreous, where it terminates in a filmy opacity. There is a good deal of pigment scattered over the retina in the periphery of the fundus. In this case it would appear that the bullet had caused vibratory concussion, or perhaps slight contusion of the right optic nerve, its path crossing below the nerve; and the excellent recovery of vision in the right eye emphasises the hopefulness which may be entertained in such cases, although it is wise to give a guarded prognosis. Judging by the complete restoration in movement, the lower portion of the 3rd nerve had probably only suffered concussion. On the left side the eyeball had been contused behind without rupture; the optic nerve had probably been lacerated or divided; there had been injury to the extra-ocular muscles, chiefly, the external rectus; and there had been considerable hæmorrhage into the orbit.

I did not come across any case of gunshot wound of the orbit which had been followed by the development of arterio-venous aneurysm and pulsating exophthalmos; nor any case in which there was evidence of injury to the chiasma, or of the optic tracts between it and the cortical visual centres.

The following two cases were uncommon in that the eyes were injured without the orbits being implicated. In both cases the bullets were split and broken up by striking a hard substance, and fragments of the leaden core flew into the eyes, in the first case without penetration, and in the second case with penetration and loss of the eye:—

A Sergeant of Yeomanry was sitting on the trail of a Colt gun, engaged in firing it, when a bullet from a range of about thirty yards struck the side of the gun close to the shield. Small fragments of the bullet were scattered over his face, eyes, and hands. Both corneæ were thickly peppered with minute fragments which were lodged at varying depth, but none had perforated. Fragments were removed at various sittings, and he made an excellent recovery.

An Officer was crouched behind a boulder engaging four Boers some fifteen yards away who were similarly sheltered. He had just shot one when a bullet fired by a Boer to his right front struck the boulder. He felt as though he had received a blow in the face, and was blinded and fell over on his back. He found that he could only distinguish light from darkness, and he lay for about two hours before he was picked up. He began to distinguish objects three hours after the injury, and saw much better next day. There were fragments of leaden core embedded in his arms, head, and face, and in the left-hand breast pocket of his tunic he found a piece of the mis-shapen mantle of a bullet with a little of the core attached. The latter had apparently passed through a thick fold in his tunic and then dropped into the pocket. In his right eye there

was a small penetrating wound 3–4 mm. to the outer side of the cornea with a minute bead of vitreous entangled in it. Ciliary injection and very sluggish pupil. T—1. Hæmorrhage and effusion into the vitreous, and some retinal detachment. Fingers counted at two feet in the outer part of the field. A radiograph taken by Mr. Hall-Edwards showed two foreign bodies, and this was subsequently verified. From the left upper lid two or three fragments of leaden core were removed, one fragment projecting under the conjunctiva. There was a contusion of the ocular conjunctiva, but this eye had escaped permanent damage.

The indirect rupture of an eyeball by a bullet in full flight, without even notching the margin of the orbit, must be an extremely rare occurrence, but it happened in the following case:—

A bullet from an unknown range passed somewhat obliquely to the plane of the face. It grooved the right side of a prominent nose, and grazed the right lower lid, just below the external canthus. There was a superficial ocular contusion corresponding to the lid injury; and there was a sub-conjunctival rupture of the globe on the opposite side, upwards and inwards, just outside and concentric with the sclero-corneal junction, with escape of the lens and some of the iris through the rupture. The retina was completely detached and there was an extensive sub-retinal and choroidal hæmorrhage greatest on the side near which the bullet passed. The fellow eye escaped injury.

Gunshot wounds in the frontal region may cause paralysis of the ocular muscles from injury to their nerves, especially the sixth; or they may cause blindness followed later by the signs of optic nerve atrophy. These complications may occur in cases of ploughing of the bone, or perforation, without any evident fracture of the vault, and are probably due to fissuring at the base of the skull across the optic foramen.

Gunshot wounds in the occipital region may give rise to altitudinal or homonymous hemianopsia, from injury to the cortical visual centres of the cuneate lobes and in the neighbourhood of the calcarine fissure. A man who was shot in the occipital region and has since left the army still complains of peculiar epileptiform attacks with visual aura. The details are as follows:—

The bullet entered on the right side $1\frac{3}{4}$ inches behind the external auditory meatus and $1\frac{1}{4}$ inches above Reid's base line and it emerged on the left side $2\frac{1}{2}$ inches above and $\frac{3}{4}$ inch to the left of the external occipital protuberance. He felt at the time he was struck as though he had been hit behind the head with a stick, and seemed to be spinning round and sinking. He was momentarily unconscious, but did not fall. He could not see, and was taken to the dressing station, where he became unconscious, and remained so for some hours. When he regained consciousness his sight returned. The wound healed without complication, and he felt no further ill effects for four months, when he commenced to be troubled with attacks of the following nature which still continue. A bright light shines suddenly in the distance, and, approaching him, appears to be joined by others from all sides. 'They work like a Catherine wheel but without throwing sparks out;' and he has a peculiar sensation across the epigastrium, and has to sit down. The attack lasts from ten to fifteen minutes. There was no family history of epilepsy, and he had never had any visual trouble

before. Pupils normal. No morbid ophthalmoscopic appearances. R.V. $\frac{6}{6}$; L.V. $\frac{6}{9}$. No ametropia. Some contraction of both fields for white and colour, especially the left.

Two cases came under my observation of gunshot wounds implicating the brachial plexus in which the cervical sympathetic was paralysed, the ramus communicans of the first, and probably also of the second, dorsal root having been injured. In both of them the cardinal ocular signs due to paralysis of unstriped muscle fibres were present. A narrowed palpebral fissure from slight drooping of the upper lid; slight enophthalmos; and a narrowed pupil not dilating in the shade, with loss of the skin reflex. The application of cocaine produced, by degrees, widening of the palpebral aperture, and slight temporary dilatation of the pupil. The cases were not seen until some few days after the injury, and there was then no appreciable difference in the tension of the two eyes. There was a diminished secretion of sweat on the same side of the face. In both cases the wound was received whilst firing in the prone position; in both there was paralysis of the arm; and in neither was there any evidence of injury to the structures of the carotid sheath.

Shell Wounds Implicating the Eyes.

In most cases where the eyes are implicated in shell wounds, the injuries are fatal. There were rare instances of the bridge of the nose being severely damaged by a fragment, but the eyes escaping.

In the first of the following cases an eye suffered a severe contusion, but was not destroyed; whilst in the second, the eyes were ruptured and disorganized in association with other injuries, as is commonly the case. The eyes may be damaged, not only by shell fragments themselves, but also by pieces of rock, stone, or gravel, thrown up by the explosion:—

The fragment of a five-pound shell which had burst a few yards away, struck a Trooper on the right side of the face and passed across his eyes. He did not lose consciousness, and did not fall at once, but went down on to the ground in something under a minute, feeling dazed. The eyes were destroyed, and the upper part of the face greatly deformed. Scars radiated from the right inner canthus, across the lids, and down the side of the nose, and there was extreme cicatricial ectropion. There were also numerous scars around the left eyelids, down the side of the nose, and across the cheek. The nose was depressed and flattened out, being quite one and a half inches across. He had a discharging sinus for some time, connected with the maxillary antrum, from which pieces of dead bone were removed. Plastic operations were performed to bring the lids together and close the palpebral apertures, thereby rendering him more comfortable, and improving his appearance.

A fragment of shell struck a soldier over the left brow, eye, and cheek. He felt as though he had been struck with a sledge-hammer, and was knocked several feet, but did not become unconscious. He could not distinguish light with the eye for fully half an hour after the blow. Iriro-cyclitis developed, and a synechia was formed upwards and inwards. Three weeks later there

remained a small, slightly depressed, dusky, scleral scar, 5 mm. to the inner side of the corneo-scleral junction, and 1 mm. above the horizontal meridan. T – 1. There were remains of vitreous hæmorrhages and effusion ; a large densely white area, with the remains of retinal hæmorrhages around, on the nasal side towards the periphery, and a mass or two of pigment between the white area and the disc. There was great limitation of the field on the temporal side, some limitation above and below, but none on the nasal side. He counted fingers at two or three feet. The vision improved in the course of the next six weeks to $\frac{2}{36}$ and J. 12. (partially). Iris greenish ; pupil sluggish ; T still minus. Some retinal detachment on the nasal side around the area of cicatrisation and atrophy. The fellow eye had $\frac{6}{6}$ and J. 1.

REPORT OF THE X-RAY DEPARTMENT.

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Although in previous small campaigns the X-rays have been used to a limited extent, the South African Campaign is the first occasion in which properly equipped X-ray departments have been sent to the seat of war.

My equipment at the I.Y.H., Deelfontein, consisted of:—

A large 14-inch spark coil, on oak table, by Deane.
A 12-inch portable coil (of my own design), by Cox, Ltd.
A 'Mackenzie Davidson' localising couch.
A 'Mackenzie Davidson' cross-thread localiser.
A 'Hall-Edwards' localising tube-holder.
Two E.P.S. accumulators, 12 volt, 48 ampère hours.
Bichromate battery, of eight cells.
Fifteen Cox 'Record' X-ray tubes.
Two fluoreseent screens.
Cycle dynamo driver,
Small dynamo for charging accumulators.
Ammeter, and voltmeter.
Large dynamo, for lighting purposes.
Tube-holders, intensifying screens, &c.
Portable developing sink.
Developing dishes, printing frames, drying stands, &c.
Photographic plates, developers, chemicals, &c., sufficient to last at least twelve months.

The apparatus placed at my disposal was as perfect as could be designed with our limited knowledge of the exigences of actual warfare; but experience has taught me that in the future several additions and omissions must be made. In addition to giving my experiences I shall endeavour to give some advice, which I trust may be of value in future campaigns.

DEELFONTEIN—X-RAY DEPARTMENT.

Although the apparatus left England a few days before we sailed, it did not reach Deelfontein until several weeks after our arrival. In the mean time I had had erected a small temporary dark-room in which some of the first X-ray negatives and many ordinary ones were developed. This room was so small that the work done therein was not as satisfactory as I could have wished. There was considerable difficulty in rendering it light-tight, and still more in keeping out the dust.

My first X-ray room was situated in the central building, at the back of the dispensary, between it and the passage which led to the two operating theatres. It was far to small for the purpose, and some of the apparatus had to be kept elsewhere.

On the completion of the dispensary, a dark-room was built for me in one corner; this was sufficiently large to hold the developing sink sent from home, and in addition there was plenty of room for the storing away of a good supply of photographic plates and chemicals. The room was lit by means of a ruby coloured window, outside which was placed a paraffin lamp. The water supply was not brought into the room; but a large sink, and supply tap, in the dispensary, just opposite the dark-room door, served very well.

The chief difficulties in the way of carrying out successful photography in South Africa are the heat of the water during the hot season, and the incessant dust storms. The first difficulty was intensified in our case by the fact that the water supply pipes (owing to the stony nature of the ground) were in many places within a few inches of the surface, and during the greater portion of the hot weather the water was so warm in the middle of the day that it melted the films from the glass. This difficulty was partly overcome by keeping a supply of water in a canvas tank, where the rapid evaporation kept the contents beautifully cool. As a rule, however, the developing was done either early in the morning, or late in the evening.

The dust difficulty is not one which is easily overcome, especially in the absence of permanent brick buildings; some of my negatives more nearly resemble a new form of sand-paper than anything else. Many of the negatives produced were considerably damaged by both of these drawbacks, but on the whole the work was eminently satisfactory.

The accumulators were, of course, sent out uncharged, and immediately on their arrival they were sent down to Cape Town to the Cape Government Railway Electrical Depôt, for the purpose of being charged. During their absence necessity arose for the application of the X-rays, and the Bichromate battery already mentioned was brought into requisition. This proved of little value, as the amount of current obtained was far short of that required for the proper illumination of the

tubes. An unnecessarily lengthy exposure had to be given, and the cells required frequent charging. This source of electricity is absolutely hopeless for X-ray work in warfare, and I have no hesitation in saying that primary batteries are not to be recommended for such a purpose. The amount of material necessary to keep them charged, and the danger of carrying such material any great distance, is a drawback to their use which cannot be overcome. On the return of the accumulators my troubles commenced, for as not infrequently happens the first charge was absolutely unsatisfactory; not only did the accumulators run down in a few days, but they had been so much damaged in their journey up-country that the acid leaked, and a considerable quantity of it had been spilt.

When the accumulators required recharging they were sent to the De Beers Electrical Workshops at Kimberley. They were kept some time, and had evidently been charged and discharged several times. In addition the cells had been covered in with pitch and vulcanite, and every precaution taken to prevent the acid being spilt. On their arrival at Deelfontein, however, I found them both leaking through their cases, and to all intents and purposes in a worse condition than when they were sent away. This was, of course, no fault of the engineers who had so kindly come to my assistance, but was due to the manner in which they had been handled by the railway officials. They were next sent to Cape Town, to be repaired, but returned in a worse condition than when they were sent away. At this juncture, I decided that it was impossible to continue work under these conditions, and secured from Cape Town a second-hand oil-engine, with which to work the dynamo which formed part of the equipment taken out from England. This worked satisfactorily.

Included amongst the apparatus provided was a specially designed foot-motor (of the bicycle type), and a small dynamo, for charging the accumulators. The bicycle arrangement was constructed upon a firm metal frame, which was capable of being bolted to the floor. It was supplied with a heavy fly-wheel, which was driven by two riders by means of a chain; a belt from the fly-wheel worked the dynamo. The arrangement was as perfect—in theory—as could be wished for, but in practice it was a complete failure, on account of the great effort required to work it.

The position chosen for the engine-house was situated on the foot of the kopje, between the kitchen and stores of the officers' mess, and the sisters' sick ward. A special hut was erected, with concrete floor, and the noise of the engine was so minimised that no complaints were made about it. Cables were carried to the X-ray department, and to the other departments which were lighted by electricity, by means of telegraph posts which had kindly been supplied to us by the officials of the Post Office.

The wiring of the various places lighted by electricity was carried out in a manner which would not fulfil the requirements of the Board of Trade, nevertheless the installation was a success, and I am pleased to say that we had no accidents. The light occasionally went out when most urgently required, but these little accidents occur in the best-regulated installations.

On the whole, our small electric light department proved a great success, and I am only sorry now that arrangements were not at first made to light the whole hospital by this means. Nearly all the large hospitals I visited in South Africa were thus lighted, and I cannot but think that in the end it would have proved the least expensive method.

I worked entirely with an electrolytic interrupter, which I made out of materials I had by me; and experienced no more difficulty than I do here in England, where every necessary appliance is at my command.

The Electrolytic Interrupter used was one made after the plan suggested by me several years ago in the columns of *The British Journal of Photography*. The vessel consisted of an extra glass cell supplied with the bichromate battery; at one end of which was suspended a lead plate, and at the other a bent glass tube into the end of which was fused a piece of platinum wire. This tube was suspended from a piece of wood which rested upon the sides of the vessel. The tube itself was filled with mercury, into which dipped a copper wire, connected with a binding screw fixed to the wooden support.

The electrolyte consisted of a dilute solution of sulphuric acid in water, the specific gravity being so arranged that only a limited, and known, quantity of current could pass. It is advisable to have in circuit a limited amount of variable resistance; but as at Deelfontein none was available, it was necessary occasionally to vary the specific gravity of the electrolyte, to meet my requirements.

I have used the electrolytic interrupter constantly since its first introduction, and although, without the greatest care, it is very destructive to the tubes, I have no hesitation in saying that it far surpasses in efficieney any other form of break.

It is only once in a dozen cases that the tube carrying the platinum will stand the heat generated for any length of time, but given a perfect tube, it may with care be made to last several months. I know of no other form of interrupter which can bear comparison with it.

This form of interrupter has an additional advantage for active service, inasmuch as it can be constructed out of the most simple material, and has no complicated mechanical parts to get out of order.

I prefer to construct such an interrupter in a large vessel capable of holding at least two gallons of electrolyte, as in this case the liquid takes some time to heat, and, as a consequence, the instrument is less likely to become 'tired.'

During my absence from England, Mr. Mackenzie Davidson invented his 'rotary mercury break,' an excellent instrument, which has one advantage over the electrolytic interrupter, in that full use can be made of the condenser of the coil; hence the spark is heavier in comparison; but inasmuch as these instruments are easily put out of order in inexperienced hands, and are with difficulty repaired, I still recommend the electrolytic interrupter, which can be constructed by any one having even a limited gift for manipulative procedure.

Before starting for South Africa I had come to the conclusion that it was in the Field Hospitals that the most useful work would be done. Actual experience, however, has shown me that this is not the case, and that although a small portable X-ray set may prove of great use, it is not here that bullets can be localised, or the exact condition of the parts shown by means of stereoscopic photographs.

The great use of a portable set in a Field Hospital is that of enabling the surgeons to discriminate between slight and serious cases, with a view to their ultimate disposal. It is true that time and pain may here be occasionally saved by rendering the removal of superficially retained bullets possible; but it is in the large General and Base Hospitals that the bulk of the work must be done.

Shortly after the discovery of the X-rays, the chief aim of manufacturers was so to reduce the bulk of the necessary apparatus that it could be transported with ease. Recent developments have tended rather to increase than diminish the apparatus required, hence it becomes more and more difficult to carry it. A Field Hospital must necessarily limit its baggage to the smallest possible dimensions, and an 'up-to-date' X-ray equipment would prove an impediment to progress.

It is true that localisation can be made by much more simple apparatus, by the aid of the fluorescent screen; but inasmuch as the work must either be done at night, or a bulky dark tent must form a part of the equipment, this method is unsatisfactory, not only from the point of view of the difficulties presented, but from the fact that 'the personal equation' plays an important part in the proceedings, and any failure to find the bullet would be laid upon the shoulders of the X-ray expert. The results of a localisation made by the method of triangulation are (granting that the procedure has been properly carried out) absolute, and inability to find the bullet must rest upon the operator, and not upon the radiographer.

Prior to my appointment upon the staff of the Imperial Yeomanry Hospital, I had only such experience in the localisation of foreign bodies as falls to the lot of a civil surgeon, but being certain of my facts I felt no anxiety about the results so long as the surgeons would accept the localisations as being scientifically accurate. In this respect I was unusually fortunate. My surgeon colleagues treated me with kindness and consideration; my advice was eagerly sought for and

courteously accepted; and, moreover, I was invited to attend every operation for the removal of a foreign body.

The method of localisation adopted was that of triangulation, the 'Mackenzie-Davidson couch,' or my own tube-holder, together with the 'Mackenzie-Davidson cross-thread localiser,' being always used.

The localisations were carried out in the usual manner, with the exception that I prefer to make the two exposures on separate plates instead of upon one, as is frequently advocated. There is a distinct advantage in adopting this method, inasmuch as the first image is not obscured by the subsequent exposure, and as the Wheatstone's stereoscope can be appealed to if its evidence should be required. My method of securing measurements from the two negatives is as follows: Upon a sheet of tracing paper are carefully drawn two lines, crossing one another at right angles, to correspond with the lines ruled upon the glass base of the 'cross-thread' localiser. This is laid upon the negative, so that the ruled lines overlie and correspond with the image produced by the wires of the localiser. The negative is now either held up against a window or it is placed upon the glass base I have already referred to, and the outline of the bullet, or other foreign body, is carefully traced with a sharp lead pencil. The procedure is now repeated with the second negative. The diagram produced is now laid upon the 'cross-thread' localiser in the usual manner, being kept in its position by weights on the corners. From this diagram a localisation can be made with as great accuracy as can be obtained by the one-negative method, and even greater than that secured with one negative placed over another. All my localisations were made in the manner described, and, as I have before stated, they all proved successful.

Localisation by means of X-rays is based upon mathematical calculation, and is so absolutely correct that it is difficult to imagine any other method of finding foreign bodies being even thought of. Yet many surgeons have come home full of the praises of the 'telephone probe,' an instrument which has some good qualities, and which is a great advance upon all previously invented probes, which, even under the old conditions of warfare, were bad, and under the new are still worse.

There is no position in the body in which a bullet cannot be found, and its position accurately localised, by means of the X-rays. Moreover, this can be done without disturbing the patient or subjecting him to anything but the slightest inconvenience for at the most a few minutes. He runs no risk of infection from dirty probes; the localisation can be made without removing any dressings; and the results are absolute.

The telephone probe is certainly useful for finding a foreign (metal) body the position of which is known, and may on occasion prove of some assistance during

an operation when the bullet is in a difficult position to get at, and when it cannot be seen.

The greatest drawback to the use of the telephone probe exists in the fact that the near presence of a foreign metal body is in no way indicated, and it is only when the metal surfaces are in absolute contact that any indication of its presence is forthcoming. An almost immeasurable thickness of tissue will prevent the instrument from giving any response; hence, apart from the fact that the smallest piece of metal can be found, granting that it can be touched, it has no special advantage over some of the previously existing probes.

It is with pleasure that I record the fact that at the Imperial Yeomanry Hospital at Deelfontein the telephone probe was never used, and yet in every instance in which the operating surgeon was called in, the bullet, or other foreign body, was found.

Before entering into any of the details of the work done, it will be well to draw attention to the combination of facts which at the present time render the use of the X-rays an absolute necessity to the military surgeon.

Prior to the commencement of the Boer War our knowledge of the effects of bullets fired from small-bore rifles was based almost entirely upon experiments made upon dead animals, and we had a very imperfect idea of what would take place when the projectiles were fired into living tissues. The immense penetrative capabilities of modern projectiles, together with the almost entire absence of wounds other than those caused by bullets, or shells, necessitated a very considerable alteration in surgical methods; and the value of a survey of the injuries done to the bones in the passage of the bullet through them must prove very great.

The small number of deaths from gunshot wounds compared with the large number wounded is due on the one hand to the use of a more humane weapon, and on the other to our advanced knowledge of surgical procedure. A glance at the list of wonderful recoveries, after serious wounds received in what used to be considered 'mortal parts,' goes to prove that under normal conditions the Mauser and Lee-Metford bullets are, from a humanitarian point of view, much superior to their predecessors. Their use has necessitated not only a complete alteration in surgical methods, but even greater alterations in our methods of attack and defence. The immense distances covered by these bullets, and their great penetrative power, has vastly enlarged the area of the battlefield, and has rendered the conflict less bloody. Under normal conditions the injuries to bones are much less serious than those caused by the old round bullet or by the Martini-Henry. Under certain circumstances, however, the present bullet is capable of producing the most serious wounds. If it be tampered with in such a way that the continuity of its cupro-nickel casing is interfered with, it takes upon itself characters

which can only be compared with those exhibited by the explosive bullet of days gone by.

Some of the worst wounds I saw in South Africa were undoubtedly the results of ricochet bullets. Such a bullet is, of course, the result of accident, but when it finds a billet it so closely resembles in effect that produced by a soft-nosed or other sporting bullet that there may be difficulty in deciding to which the result is due. A ricochet bullet has frequently imparted to it an amount of spin which renders its effect terrible, both upon the soft parts and upon the bones; the result being in direct ratio with the rate of spin. It will easily be seen that a bullet revolving upon its short axis, and making one revolution in a yard of travel, is not likely to produce anything like the effect upon the tissues which would be produced by one making two revolutions in an inch. In several cases which have come under my notice, in which severe lacerated wounds were caused by bullets which, upon extraction, showed but little evidence of injury, I feel convinced that the results were due to a spinning ricochet; the spin being imparted to the bullet by its having struck some semi-yielding body before finding its billet. In no other way could I account for the serious injury produced.

In one case which occurs to me, a patient was admitted to hospital with a severe lacerated wound an inch in diameter, situated about the middle of the crest of the ilium on the left side. The bullet was localised and extracted from the lumbar region, where it was found lying close to the spinal column near the transverse process of the third lumbar vertebra. On extraction, the bullet showed a dent upon its nose, which pointed to its having struck some fairly hard substance before entering the body. Under ordinary circumstances, I should have been told that the dent was due to its having struck the bone, but in this instance the size and shape of the entrance wound were undeniable evidence of the missile having entered the body under abnormal conditions.

I must admit that my experience agrees with those who contend that there is no evidence that an intact Mauser or Lee-Metford bullet can be flattened against bone, no matter at what range it may have been fired. All the flattened or mis-shapen bullets which have come under my notice were undoubtedly injured before entering the tissues, and I feel certain that in the cases recorded in which bullets are supposed to have been grooved by having come in contact with soft bones, the result was the outcome of a ricochet. That this is not the generally accepted theory I am well aware, but there are differences of opinion on the point, and I claim to agree with those who contend that no intact Mauser or Lee-Metford bullet can be flattened against living bone.

Mr. George Henry Makins, F.R.C.S., in his *Surgical Experiences in South Africa*, says: 'Some of the specimens removed offered interesting evidence of

the capacity of the ribs to withstand considerable violence from a bullet. These were slightly bent, and marked by a half spiral groove. I saw such bullets removed from the thoracic and abdominal wall, and the evidence seemed rather against the groove having been produced prior to their entrance into the body.'

The fact that these bullets were retained goes to prove that, for some reason or another, their energy must have been nearly spent, and if they were fired at short range they therefore could not have made a direct entry into the tissues. I have seen several bullets extracted from the shafts of long bones which showed no evidence of having struck anything. On the other hand, in a case in which a soft lead shrapnel bullet passed completely through the head of the tibia, and lodged under the skin on the opposite side, it was found on removal to be perfectly intact, and exhibited no signs of injury from impact.

The injuries inflicted upon our soldiers differed widely according to circumstances; for whilst we used one form of projectile almost universally, the Boers employed several varieties, amongst the most common of which were the Spanish Mauser, the Guedes, the Krag-Jorgensen, and the Martini-Henry, in addition to which they not infrequently turned our own weapon against us. There can be little doubt that, with the exception of the Martini-Henry, there is little difference in the results produced, although it is probable that the steel-coated projectiles—viz., the Guedes and the Krag-Jorgensen—are less liable to injury from impact with anything but very hard substances.

'Nothing is more certain than that the outward appearances in bone injury produced by small-bore projectiles convey no certain indications of the extent of the damage which may exist within, and nothing will supply information on this point except exploration with the finger.' This statement is taken from Surgeon-Colonel Stevenson's excellent book on *Wounds in War* (1897 edition); but since it was written a great change has come over things. Thanks to Professor Röntgen's wonderful discovery, we have at hand a method of examination and localisation of unsurpassed accuracy and perfect freedom from danger, which constitutes one of the greatest advances in surgical procedure. To military surgeons, at least, the X-rays offer immeasurable help, which, when taken full advantage of, will prove of equal importance with the introduction of aseptic methods.

The advantages offered by localisation by means of the X-rays are so great that it is next to waste of time to enumerate them; but inasmuch as up to the present time they are not fully appreciated, it may be well to draw attention to them. They are:—

Absolute accuracy.

Localisations made without removing dressings.

Absence of risk of infection.

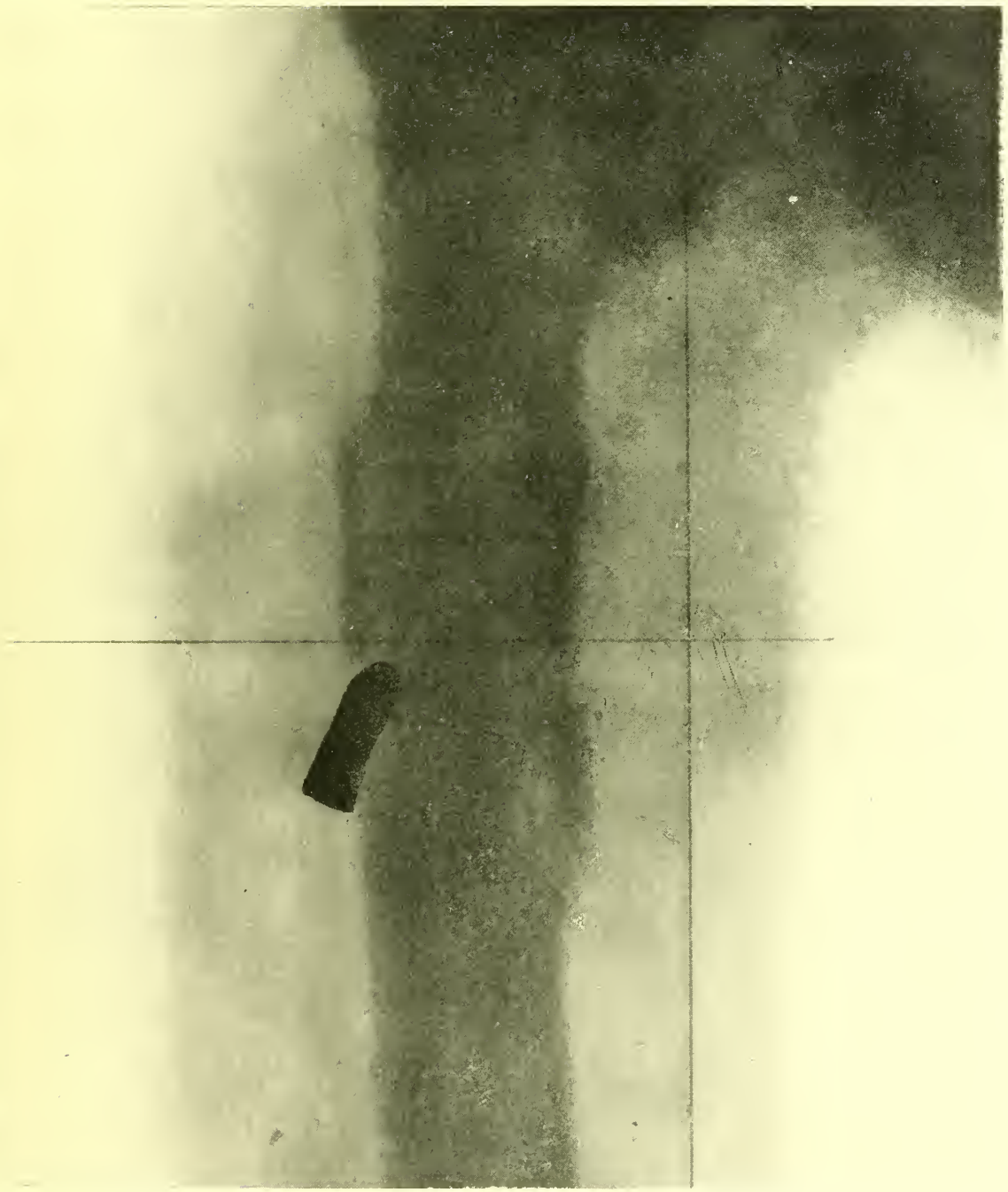

FIG. 21.—REPAIRED FRACTURE OF FEMUR, WITH RETAINED MAUSER BULLET.
(The bullet was subsequently extracted after localisation.)

Patients put to a minimum of inconvenience.

The exact amount of injury to bones can be ascertained.

Ability to decide at once the best method of procedure.

No matter how far a bullet is situated from its point of entrance, its position can be ascertained in a few minutes.

The localisation of bullets in positions which are inaccessible to any form of probe can be made with as great an amount of ease, and with as perfect accuracy, as those which can be detected by palpation.

This list of special advantages is sufficient in itself to place all other methods out of court, yet some of them have been persisted in, in the face of our advanced knowledge. Under normal conditions (with an X-ray apparatus at hand) there should be no further need for meddlesome and undue exploration.

During my fourteen months' experience at Deelfontein 280 cases of one sort or another came under my observation. Of course many of these were examined on several occasions, and three negatives were invariably produced when a localisation was found necessary. In a large number of cases of fracture as the result of gunshot injury, examination by means of the X-rays greatly facilitated the treatment; and I may here mention as a result of the knowledge gained by this means, and the careful carrying out of antiseptic precautions, it was only found necessary in two instances to resort to amputation.

I will first deal with those cases in which the presence of a foreign body was suspected. Of these 189 came under my notice, out of which, in 65 cases, bullets, portions of bullets, or fragments of shell were localised.

The following table shows the parts injured; the number of cases radiographed; and the number in which foreign bodies were found, and localised:—

Parts Injured.	Number of Cases Radiographed.	Number of Cases in which Foreign Bodies were localised.	Parts Injured.	Number of Cases Radiographed.	Number of Cases in which Foreign Bodies were localised.
Eye	3	1	Spine	1	1
Head	11	1	Back	5	3
Neck	2	1	Pelvis	6	4
Chest	18	7	Thigh and Hip ...	30	18
Shoulder	10	1	Knee	8	3
Arm	13	4	Leg	16	8
Elbow	14	2	Ankle	—	—
Forearm	10	1	Foot	18	2
Wrist	3	0		—	—
Hand	19	8	Total	189	65
Abdomen	2	0			

FIG. 22.—COMMINUTED FRACTURE OF TIBIA FROM BULLET WOUND.

(Fragments of the bullet are retained.)

In looking over this list, it is interesting to note the positions in the body in which the largest number of bullets were retained. I am not in a position to even guess at the percentage of retained bullets after gunshot injuries; but my table goes to prove that it is considerably higher than is generally believed.

There can be little doubt that bullets fired at long range are, in ordinary circumstances, much more liable to be retained than those fired at close quarters. The extreme variation of this distance given by my patients goes to prove, either that they had no idea of judging distance, or that some of the factors already mentioned must have contributed to the lessening of the speed of the projectile.

It is more than probable that some light will be thrown on these important points when the official report of the surgical work done in South Africa comes to be published. My figures must, of course, not be taken as throwing any light upon these points, for there can be little doubt that in many instances in which the presence of a bullet was suspected, the cases were specially sent to us, for purposes of localisation.

The list is interesting as showing that by far the greater majority of retained bullets were found between the ankle and the abdomen; whilst the upper extremities were comparatively free; with the exceptions of the chest and hand. It will be noticed that out of eleven cases of injury to the head, only one bullet was localised; and as in all probability the head is one of the parts most frequently struck, and as the amount of resistance offered by the skull is comparatively great, the explanation of the small number of retentions must be due to the fact that in a very large majority of such cases the recipients of the wounds are killed outright, or die shortly after receiving their injuries.

As to the number of bullets which were removed after localisation, I am unable to give absolutely accurate figures; but from my notes I can account for more than three-fourths of the total.

The question of the removal of bullets after localisation (except in cases where the gravity of the symptoms urgently demand it) is one in which there are great differences of opinion; at the same time it is of great importance, and one which cannot be overlooked. In considering the question it must be remembered that in the X-rays we have at our disposal a means of localising bullets with absolute accuracy, and that advances in surgical procedure have considerably lessened the risk attendant upon an operation.

It is well recognised that bullets can be retained in the tissues for half a life-time without producing any serious results. On the other hand, retained

bullets have proved an active source of irritation after having lain in a quiescent state for years. Whether or not the modern projectile, with its cupro-nickel or steel casing, will prove as inert as the old leaden bullet remains to be seen. Experience in this direction is as yet limited, and various opinions have been expressed as to the advisability of removing the majority of retained bullets. It must, however, be admitted that when only a slight risk is run the bullets are far safer in the patients' pockets, than in their tissues.

By far the largest number of the bullets localised at the Imperial Yeomanry Hospital at Deelfontein were removed, and in several instances the operation was more than justified by the condition found.

Case 1.—A Private in the 1st Dragoon Guards was shot on February 14th, 1901, at Hout Kraal. He was advancing up a kopje when he was struck. The entrance wound was situated just below the middle of the iliac crest on the left side. It was about the size of a shilling, and presented rough and jagged edges. There was no exit wound. The bullet was localised close to the spinal column, between the second and third lumbar vertebræ, at a depth of one and a half inches from the skin. The only symptom was pain in the back on walking; nevertheless, it was decided to remove it.

The bullet was found lying in a sac containing about half an ounce of semi-purulent fluid, together with several pieces of dead bone from the transverse process of the third lumbar vertebra. The patient made a rapid recovery, and was discharged cured. Although it is impossible to predict what might have occurred had this bullet been allowed to remain, there can be little doubt that all future anxiety has passed away with its removal.

Case 2.—A Private in the Cameron Highlanders was shot at Spitz Kop on July 20th, 1900. He was advancing at the double when a bullet struck him in the groin on the left side, just above the middle of Poupart's ligament. There was no exit wound. On admission to the Imperial Yeomanry Hospital he complained of pain on walking, and the movements of the hip were restricted. The bullet was localised at a depth of two and a half inches from the surface of the buttock, upon which he was lying during the taking of the radiograph; so that the total depth was little short of three and a half inches. Operation was performed by Mr. H. A. Ballance. The bullet was found embedded in the neck of the femur, and was with some trouble removed; it was uninjured. The patient made a rapid and complete recovery, and returned to England with perfect movement in the joint.

I could mention other cases in support of my advocacy for the removal of all easily get-at-able bullets; but these are sufficient to prove that at any rate on occasion their presence is a source of considerable danger. Time alone will show how the retained bullets will behave, and no definite opinion can be formed until the reports are forthcoming.

Case 3.—The most interesting case was without doubt that of Major M., who was wounded on May 13th, 1900, in the ambush attack which the Boers made upon Colonel Mahon's Mafeking Relief Column, near Maritsani. A Mauser bullet struck him in the back and buried itself in his spinal column, causing paralysis of both legs, and the sphincters. The patient lay for some weeks

at a farm-house near the battlefield. He was afterwards removed to Mafeking, and was subsequently sent to Deelfontein. The bullet was found lying opposite the body of the first lumbar vertebra, at a distance of one and a half inches from the skin, and it was evident that most of the symptoms were due to the pressure exerted upon the spinal cord by the projectile. Mr. Fripp performed a laminectomy, and removed the bullet together with a piece of bone from the transverse process which had been driven in with the bullet. Both produced pressure and contributed to the symptoms.

After the operation the patient made a rapid recovery, he speedily recovered the use of his sphincters, and although when he left for England he was unable to stand, he has now sufficiently recovered to get about with the aid of sticks.

This case is particularly interesting, because without the use of the X-rays it would have been absolutely impossible to locate the bullet.

I have purposely refrained from mentioning many other interesting cases, preferring to leave them entirely in the hands of other members of the staff who contribute to this Report.

IMPERIAL YEOMANRY BRANCH HOSPITAL, MACKENZIE'S FARM, CAPE TOWN, MEDICAL AND SURGICAL REPORT,

BY

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Assistant Surgeon to the Westminster Hospital;

AND

LIONEL E. C. HANDSON, M.B., B.S.,

Physician to the Hospital.

August 2nd, 1900, *to March 31st*, 1901.

The Branch Hospital at Mackenzie's Farm, Maitland, was the base hospital for Imperial Yeomen from August, 1900, to March, 1901, and it was from here that invalids were sent to England.

The patients came from four sources:—

1. The Imperial Yeomanry Base Depôt Camp at Mackenzie's Farm.
2. From other Base Hospitals in Cape Town district.
3. Transports in Table Bay, at which port men arrived from England, from Natal *viâ* Durban, or from Beira *viâ* Delagoa Bay.
4. From hospitals up country coming down by the Cape Government Railway, especially from other Imperial Yeomanry hospitals at Pretoria and Deelfontein.

Those in Class 1 consisted mostly of casualties and acute cases; those in Class 2 were Yeomen who had been sent into other hospitals (R.A.M.C.), and were transferred for treatment or to be sent home as invalids, under which latter circumstance they had to be examined by the Medical Board at Mackenzie's Farm; Class 3 included cases acute and convalescent; and Class 4 were nearly all to be sent home as invalids.

A large percentage of the patients were of the latter class, *i.e.*, convalescent patients waiting to be sent home as invalids, and of these nearly thirty-five per cent. were sufficiently well to be put under canvas, draw their own rations, and look after themselves while in hospital. (Of course they were seen daily by the medical officer on duty.) It was in consequence of so many patients being convalescent that the work was able to be done with such a small staff of medical officers (3) and sisters (4).

IMPERIAL YEOMANRY HOSPITALS.

Below is a tabulated statement of the cases admitted:—

Medical Cases.

	Admitted.	Died.	Transferred.	Returned to Duty.	Invalided.
Scarlet fever	4	—	—	—	4
Tonsillitis	5	—	—	2	3
Influenza	12	—	—	5	7
Simple continued fever	6	—	—	—	6
Pyrexia	25	—	—	16	9
Enteric fever, acute	39	4	8	2	25
,, ,, convalescent	155	—	—	26	129
Malaria	36	—	—	5	31
Diarrhœa	25	—	—	8	17
Dysentery, acute	15	1	—	4	10
,, chronic	69	—	—	6	63
Rheumatic fever	9	—	—	—	9
Chronic rheumatism	89	—	—	10	79
Phthisis	3	—	—	—	3
Cardiac disease	36	2	—	1	33
Debility and Anæmia	59	—	—	16	43
Jaundice	8	—	—	2	6
Gastritis	12	—	—	3	9
Stomatitis	6	—	—	—	6
Pneumonia	5	—	—	1	4
Pleurisy	5	—	—	1	4
Bright's disease	4	—	—	—	4
Insanity	5	—	—	—	5
Locomotor ataxy	1	—	—	—	1
Neuritis	3	—	—	1	2
	636	7	8	109	512

Surgical Cases.

	Admitted.	Died.	Returned to Duty.	Invalided.
Injuries—Gunshot wounds	92	—	7	85
Fractures of skull	1	1	—	—
,, ,, clavicle	3	—	2	1
,, ,, jaw	1	—	1	—
,, ,, tibia and fibula	4	—	1	3

BRANCH HOSPITAL, MAITLAND.

	Admitted.	Died.	Returned to Duty.	Invalided.
Injuries—Dislocation of shoulder	1	—	—	1
„ „ patella	1	—	—	1
„ „ thumb	1	—	1	—
„ „ fingers	1	—	1	—
Contusions of spine	3	—	—	3
„ „ knee	15	—	1	14
„ general, from falls from horse	20	—	3	17
Lacerated wounds	16	—	5	11
Unclassified cases	50	—	—	50
Diseases—Sunstroke	9	—	—	9
Erysipelas	2	—	—	2
Gonorrhœa	15	—	5	10
Syphilis	7	—	1	6
Furunculosis	4	—	2	2
Eczema	2	—	2	—
Veldt sores	3	—	—	3
Digestive—Defective teeth	98	—	—	98
Hernia	5	—	—	5
Appendicitis	6	—	1	5
Hæmorrhoids	6	—	3	3
Liver abscess	1	—	—	1
„ bile cyst of	1	—	—	1
Ears—Deafness; Chronic otitis media, non-suppurative	4	—	—	4
Ditto, suppurative	4	—	—	4
Eye—Conjunctivitis	5	—	1	4
Defective sight	15	—	—	15
Iritis	3	—	—	3
Urinary—Hæmaturia	3	—	—	3
Renal colic	1	—	—	1
Retention of urine	2	—	—	2
Cystitis	1	—	—	1
Spermatorrhœa	3	—	2	1
Undescended testicle	1	—	—	1
Varicocele	1	—	—	1
Local—Ingrowing toe-nail	2	—	2	—
Varicose veins	5	—	1	4

Diseases—	Admitted.	Died.	Returned to Duty.	Invalided.
Local—Ulcers on leg	8 ...	— ...	6 ...	2
Enlarged glands in neck	4 ...	— ...	2 ...	2
	430	1	50	379

We propose to report on the professional work under three headings:—I., Medical; II., Surgical; III., Invaliding.

I.—Medical Report.

From a medical point of view, the most interesting work was in connection with the cases of enteric fever. There were thirty-nine acute cases, all of which must have contracted the disease in the Imperial Yeomanry Base Depôt Camp at Maekenzie's Farm.

The source of infection in these cases could not be traced to the water supply, which was the same as that supplying the hospital and Cape Town, and enteric fever was not epidemic at the hospital or among the civilian population. It must surely be looked for in the soiled ground, and the carrying of infected material therefrom to the food by flies and dust.

The type of the disease was very severe, and the pyrexia and cardiac debility were more marked than in the general run of cases we had met with up country. Another peculiar feature was the long continuance of the pyrexia, which in one case lasted for fifty days. In this case there was a severe relapse six days later.

We had one great advantage over most other hospitals at Maekenzie's Farm, in that the cases came into hospital on the first or second day of the disease, and it is worthy of note that in the majority of cases the temperature for the first ten days did not rise above 101°, but at the end of this interval it suddenly shot up to 104° or 105°, and remained there, with daily remissions, for a further fourteen or fifteen days.

The four deaths all resulted from cardiac debility.

Diarrhœa, hæmorrhage, or other intestinal symptoms were not marked features of the disease, except in two cases.

The following case of dysentery without diarrhœa, closely simulating enteric fever, is worthy of note:—

Sergt.-Major C., I.Y., aged 46, was admitted on January 5th, suffering from pyrexia, headache, and general malaise of two or three days' duration. Since he first felt unwell his bowels had been twice opened, the motions being formed, and nothing abnormal about them noticed. About a month previously, when 'up country,' he had had an attack of diarrhœa lasting for a few weeks, but he

had not then noticed any blood or slime in the motions. For the first five days that he was in hospital his temperature ranged between 99° and 101°; but at the end of that time, it rose considerably higher, and oscillated between 101° and 102° in the morning and 103° or 104° at night. The headache persisted for the first week and then passed off; the tongue was coated with brown fur, and there were sordes on the lips and teeth. The abdomen was slightly distended, and for the first fortnight not tender; the edge of the spleen could be felt below the ribs, and there were a few raised pink spots on the abdomen which soon faded away.

The bowels were opened naturally three or four times during the time he was in hospital, but on four occasions it was found necessary to administer soap and water enemata, and there was never any diarrhœa. The stools were always formed, of a brown colour, and free from blood or mucus.

During January 22nd, 23rd, and 24th, he complained of attacks of pain in the lower part of the abdomen, and of some pain and difficulty in micturition; however, during these three days the symptoms were quickly relieved by small doses of tinct. opii and hot applications.

On the 24th the temperature became extremely irregular and continued so to the end, ranging in very erratic fashion between 104° and 97°.

On the morning of the 25th there was great and sudden increase of the abdominal pain and every indication of acute peritonitis; these symptoms so simulated the perforation of an enteric ulcer, that the question of operation was put to the patient, who begged to have it done. Accordingly A. C. E. was administered and an incision made in the right semilunar line, when it was found that peritonitis was general and due to numerous small perforations of the large intestine, especially the transverse colon; the cavity was sponged out and drained with gauze, no further treatment of the ulcers being deemed possible.

The symptoms gradually increased, and he died on the 26th.

At the autopsy it was found that there was general peritonitis, and that the whole of the large intestine was riddled with ulcers, especially the sigmoid flexure and ths transverse colon. In both of these latter situations the ulceration was so extreme that there was very little mucous membrane left. The ulcers were of varying size, shape and depth, and in two or three places in the transverse colon there was perforation of the gut with escape of intestinal contents. The mesenteric glands of the large intestine were enlarged and red. The ileum was free from ulceration, and here there was no enlargement of the mesenteric glands. The liver appeared normal, but the spleen was enlarged and soft.

The diagnosis and treatment of cases such as the above are rendered extremely difficult, owing to the more or less persistent constipation, and the entire absence of blood and mucus from the stools. Moreover, when the bowels have to be opened by enemata, and when to the negative features above mentioned, positive symptoms are added agreeing so very closely with those usually found in enteric fever, which is epidemic at the time, the diagnosis of dysentery becomes almost impossible.

The eight cases of jaundice all occurred within a short time of one another, and this fact points strongly to the epidemic nature of the complaint. Another rather striking feature was that gastro-intestinal disturbance, accompanied by severe mental depression, preceded the appearance of jaundice by three or four days, so that the complaint could almost certainly be diagnosed before the jaundice showed itself.

The Imperial Yeomanry camp and hospital were fortunate in that no cases of plague occurred in them, although the Plague Hospital was within 600 yards,

and several cases did occur in the neighbouring camp at Maitland, owing probably to the fact that a large number of natives were employed there.

II.—Surgical Report.

The surgical work at the hospital differed very little from the every-day work in any general civilian hospital, with the exception of the fact that a large number of gunshot injuries and shell wounds were seen, but these were without exception met with only in the later stages, and save for a few cases of compound fractures, were healed on admission, as the cases came from up country, and had passed through at least one and often many hospitals before reaching Cape Town.

The particular symptoms requiring treatment in these cases were the stiffness in movement of joints and tendons, and, in those cases where the nerves were injured, the loss of function in the parts supplied by them. In all these cases the great benefit of massage was seen, and it was no uncommon thing for the masseur to rub thirty cases a day.

Two interesting cases of the result of wounds by a Mauser bullet passing through the chest came under our notice:—

1. An Officer, Imperial Yeomanry, was shot in action at Weltevreden, on October 20th, 1900, presumably by a Mauser bullet, which entered half an inch below and just to the left of the cardiac impulse, and passed out at the posterior axillary line on the right side, in the sixth intercostal space. He told us that he was extremely collapsed after the injury, and was too ill to be removed to the hospital, but was treated in a farmhouse for four or five days and was then transferred to hospital. During this period he had hæmoptysis, but not in great amount. He came under our care on November 30th, six weeks after the injury, and on examination the whole of the right lung was out of action. There was absolute dulness up to the second intercostal space in front and behind, some bulging of the chest-wall on that side, and every indication of a large collection of fluid. The cardiac impulse was, however, only just to the left of its normal position. He was anæmic, and had great dyspnœa on exertion, though he said that he was very much better than he had been, and considered himself almost convalescent.

A needle was inserted in the seventh space in the right posterior axillary line, but although the point of it was felt to be in more or less of a cavity, nothing was drawn off. It was then decided to explore more thoroughly under an anæsthetic, and two days later chloroform was given and a large needle of an aspirator used. It was introduced in seven or eight places at various depths, and the same feeling of the point being in a cavity containing fluid or some very soft material experienced. Very small collections of fluid were found and withdrawn, but in all not more than three ounces were removed. The condition was undoubtedly one in which there had been an effusion of blood into the pleural cavity, which had practically all coagulated, leaving little cavities of blood-stained serous fluid here and there. Very rapid improvement took place after this procedure, the upper lobe of the lung within a day or two being found to have air entry. Seven weeks after admission he left for Madeira, breath sounds having returned down to the sixth rib, and there was only absolute dulness at the extreme base behind.

We had an opportunity of examining him again in the summer of 1901 in England, and he was then very greatly improved; there was excellent air entry to the extreme base, with only a little impairment of resonance from the ninth rib. There was still, however, some slight dyspœa on unusual exertion.

2. The second case was that of a Corporal in the Imperial Yeomanry, who was shot on the same day in the same engagement, the bullet in his case passing in an antero-posterior direction through the left chest outside the nipple line in the fourth space. Very similar symptoms to those in the case just mentioned had followed the injury, but on admission his general condition was not so good as in the former case, since he had orthopnœa, and was of a dusky colour. Every indication of a large collection of fluid on the left side was present, and an aspirating needle having been introduced in the seventh space, over a pint and a half of blood-stained serum was removed. This was followed by immediate relief, but subsequent reaccumulation of fluid necessitated two further aspirations, when very considerable quantities were withdrawn, the fluid in both instances being simply serous and not blood-stained. He left the hospital two months later, the left lung acting to the base but with some impairment of the note behind.

It is interesting to note that these two patients were shot in the same engagement on the same day, and were aspirated six weeks after the injury within a few hours of one another. But whereas in the former the blood had nearly entirely coagulated, and only after many punctures were made some three ounces of fluid were removed, in the latter the collection was presumably almost entirely fluid, since so marked an improvement followed the first tapping, although a subsequent pleural effusion necessitated two further aspirations.

Of the cases of appendicitis, six in number, three required operation, and of these one showed some interesting symptoms, as follows:—

Sergt.-Major W., aged about 32, was admitted to the hospital about ten o'clock in the evening, on August 8th, 1900, suffering from acute pain in the lower part of the abdomen, and intense pain on passing water, which was bright red with blood.

His previous history was that, during the preceding two years, he had had two attacks of pain in the abdomen, associated with constipation, the last one having been diagnosed as appendicitis. On and off, during the previous six or seven weeks, he had had a little pain in the right iliac fossa, but had not had to report sick for the same. He was employed at the camp on light duty, as he was not considered well enough to go up to the front.

On the evening of admission, having done his work all day, and being as he said in his usual health, after having had supper he went to his tent, and about nine o'clock was seized quite suddenly with very acute pain at the bottom of the stomach, which caused a great and frequent desire to pass water. On each occasion micturition was extremely painful, the amount of urine passed very small, and consisted practically of pure blood.

On admission, he was greatly collapsed, perspiring freely, and had a very feeble and rapid pulse. A hypodermic injection of morphia had been given prior to his being sent to the hospital, but his pain was so great, and the strangury so urgent, that more had to be administered at once. There was extreme tenderness and rigidity over the hypo-gastric region, but no swelling or distension of the gut. Examination per rectum revealed nothing, except extreme tenderness over the prostate. There was no marked tenderness over McBurney's spot, or alteration of percussion note, or rigidity in the right loin. Perforation of the appendix was diagnosed, but his general condition was so unfavourable that it was decided to postpone operation until he had rallied from the shock. Morphia was given every four hours, and the next day, under chloroform, an incision was made in the usual line for removal of the appendix,

but going about a inch and a half lower down towards the crest of the pubes, and the peritoneal cavity opened. Pus was almost immediately found, and at the bottom of the abscess cavity a gangrenous appendix, lying in the pelvis, discovered, the apex being firmly attached to the reflection of peritoneum passing from the bladder to the rectum. This was carefully separated and removed, the cavity sponged out, a large drainage tube passed to the bottom of the wound, and gauze packed around it.

The operation produced no appreciable shock, and the bladder symptoms began to improve immediately. Blood disappeared from the urine in twenty-four hours. A considerable amount of pain, however, necessitated the continuance of morphia in small quantities. All went well until the sixth day, when it was noticed that the temperature was a little raised at night, and he complained of some pain again on passing water. The wound was dressed, carefully examined, and a little swelling was found corresponding to the region behind the lower part of the recti muscles, with a little rigidity and tenderness. On passing a catheter, eighteen ounces of urine were drawn off, with distinct relief of symptoms; but the temperature still continued raised, and a swelling, corresponding almost exactly to an enlarged bladder, was detected forty-eight hours later, which did not disappear on passing a catheter, and which, per rectum, gave the sensation of a large collection of fluid in Douglas's pouch. Chloroform was again given, and the wound, which during this period had been draining satisfactorily and appeared to be going on well, was carefully explored with the finger, and a large collection of pus found on the inner side between the coils of small intestine. This was drained with a tube and gauze in the usual way. Convalescence was slow but uninterrupted, save for a sinus which persisted for nearly four months, but which then closed completely. This sinus was over seven inches long, and passed downwards and inwards towards the perineum, and the point of a probe inserted in it could be felt, per rectum, an inch and a half from the anal margin and just between the anterior wall of the rectum and the right side of the prostate. The advisability of making a counter-opening in the perineum was discussed, but it was decided to wait. This turned out satisfactorily, for by passing a small tube to the bottom, and gradually shortening it, the sinus slowly healed up completely from below. He was in hospital altogether five months, then returned to light duty as before, and three months later, being quite sound, was returned fit for service at the front. He has since been in the fighting line, and when heard of last, shortly before Christmas, 1901, was quite well and not suffering any effects from his illness.

This case is interesting on account of the position of the appendix, and because of the severe bladder symptoms which masked the abdominal ones in the first instance. At the beginning of the illness the marked strangury was especially misleading, and later on when a second intra-peritoneal abscess formed between the coils of small intestine in Douglas's pouch, it is curious that this was associated with further strangury, which was temporarily relieved by the passage of a catheter. To complicate matters still more, the abscess had the situation and appearance of a distended bladder; but, of course, this latter feature was not altered by catheterisation.

The percentage of venereal cases was very low, and at least one-third of these contracted the disease in England.

No special comment is needed about the other cases which were admitted on the surgical side, as they were mostly similar in nature to those found on the surgical side of a hospital at home. We might, however, mention the ease and rapidity with which wounds of all kinds—septic, lacerated, &c.—healed, with little or no tendency to trouble in the way of spreading cellulitic inflammations.

III.—Invaliding.

This department of our work occupied a very considerable portion of our time whilst the hospital was under our care; since it devolved upon us to examine and decide whether all Imperial Yeomen coming down country should be sent home or returned to duty. A large number of these men were never patients at Mackenzie's Farm Hospital, but being sufficiently convalescent to leave hospital, although in many instances quite unfit to return to duty, owing to the results of gunshot wounds, &c., were sent to the Imperial Yeomanry Base Depôt to await a transport, or else rejoin their respective companies if the Medical Board considered their condition sufficiently satisfactory.

Each man had to be thoroughly examined, and the various details of the form on following page filled in.

Men were invalided under three headings:—

1. For discharge as permanently unfit for further service either at home or abroad; *e.g.*, cases of valvular disease of the heart, amputation of the arm or leg, deafness, &c.

2. Those unfit for service in South Africa owing to the climatic conditions; *e.g.*, cases of chronic dysentery, chronic rheumatism, malaria, &c.

3. Those unfit for service in South Africa for at least three months: *e.g.*, certain cases convalescent from enteric fever, slighter gunshot wounds, cases suffering from defective teeth, &c.

The reasons for invaliding men in Classes 1 and 2 are self-evident, and do not call for further remark.

In Class 3, however, of which the convalescent cases from enteric fever formed a very large percentage, the main symptoms calling for such a long rest, were, first, tachycardia; secondly, pronounced anæmia; and lastly, general 'flabbiness,' both mental and muscular. Here also must be mentioned the large number of cases that had to be sent home on account of the condition of their teeth. In most of them practically all the molars were in advanced stages of caries, so that mastication even of soft food was greatly impaired, and of ordinary rations, not to mention 'biscuit and bully beef,' impossible; moreover, in consequence, nearly all of them suffered from severe stomatitis and indigestion. It was found impracticable to provide these men with false teeth, owing to the time which must elapse before the gums would have been in fit condition to have them fitted, and the want of mechanical working Dentists enhanced this difficulty.

A small number of cases requiring operative treatment before being fit for service, *e.g.*, hernias, varicoceles, &c., were sent home under the same heading, owing to the tedious convalescence which would necessarily ensue before they would be fit for active service.

NOMINAL ROLL OF N.C.O.'s. AND MEN WHO ARE TO BE INVALIDED TO ENGLAND.

(*Date*)

CORPS.	No.	RANK AND NAME.	DISEASE.	Require lying down accommodation by Rail.	Can sleep in Hammocks.	Require lower Berths.	If supplied with necessary Clothing.	If fit to do Duty on Board.	If fit to eat Troops' Rations.	If Wounds require Dressing.	Religion.		REMARKS.

IMPERIAL YEOMANRY FIELD HOSPITAL AND BEARER COMPANY

MEDICAL AND SURGICAL REPORTS.

The report of the Field Hospital and Bearer Company is chiefly based on observations made upon the 1267 cases shown in the returns as admitted to the hospital. The 2982 cases entered under the head of casualties were not important or severe enough to invalid the patients to a stationary or base hospital, but were treated by us day by day in the field. Some of the worst cases were taken into the hospital for the night, so that they might be under canvas and receive extra rations. These casualty cases were for the most part suffering from veldt sores, acute or chronic diarrhœa, slight hæmorrhoids, dental caries, bruises, and other trivial injuries. They were, indeed, precisely on a par with the average run of cases which daily seek relief in the casualty-room of a general civil hospital.

For the purposes of the report the cases have been divided into two groups, surgical and medical; and the first has been further subdivided into injuries inflicted by bullets and shell, surgical injuries not necessarily incident on war, and surgical diseases.

Before proceeding to discuss these various subjects, attention may be drawn to the percentage of surgical and medical cases: our statistics show this to be 342 in the former (excluding accidental surgical injuries and diseases) as against 665 in the latter. This fact is drawn attention to, not because it is peculiar for this disproportion—indeed the statistics for the war work out much higher—but because it points a moral which in these days of high sanitation and preventive medicine should be taken advantage of in the future. If our casualty cases were included, the proportion of medical cases to wounds would be still further increased.

IMPERIAL YEOMANRY HOSPITALS.

In no war of modern or remote times have the missiles of the enemy (against which effective precaution cannot be taken) been anything like so disastrous as has been disease, which in these days can for the most part be averted. The epidemic of enteric which swept through the army in South Africa ought never to occur again; the disease is preventable, and ought to be prevented; that it can be quite eliminated from a future campaign is perhaps too much to hope or expect, but that it can be reduced to a comparatively insignificant factor no intelligent man can doubt.

In instancing enteric, one takes that disease which was most prominent because most fatal, indeed it was the bugbear of all; but it is not to be lost sight of that this is by no means the only disease which properly organized camp sanitation and attention to the purity of drinking water would do so much to prevent. Such attempts at prevention must, however, be placed under the control of experts, and the rules and tenets promulgated by them must be so ingrained in the soldier as part of his training that they will not fail when the time arrives. The British soldier is no fool, and if he be shown the reason why, and educated up to the common requirements of modern sanitation, he will be the first to recognise their value to himself and his fellows, and do his best to give practical effect to his knowledge.

Analysis of Patients treated by the Imperial Yeomanry Field Hospital and Bearer Company.

Admitted into the Field Hospital—	
Medical cases	665
Surgical cases: Wounds, 342; accidents, 115; diseases, 145 ...	602
	1267
Casualties treated by the Field Hospital in the field	2982
Cases „ „ Wonderfontein Detachment	120
„ „ „ Field Hospital at Bloemfontein	175
„ „ „ „ „ on the transport *Winkfield* ...	100
„ „ „ „ „ on the transport *Harlech Castle*	117
„ „ „ „ „ in the Boer laager at Rietfontein (Commando Nek)	146
„ „ „ Pretoria Detachment in No. 3 Model School ...	436
Total	5343

FIELD HOSPITAL AND BEARER COMPANY.

ARMS OF THE SERVICE.

Analysis of Admissions.

	Regular Army.			Militia.	Yeomanry.	Volunteers.	Colonials.	Boers.	Natives.	Total.
	Artillery and Corps Troops.	Cavalry.	Infantry.							
Officers.	5	4	12	4	10	—	20	—	—	55
N.C.O.'s & Men.	105	35	378	72	301	12	275	14	20	1212
Total.	110	39	390	76	311	12	295	14	20	1267

C. S.

SURGICAL REPORT.

By CHARLES STONHAM, C.M.G., F.R.C.S.,

Senior Surgeon, Lecturer on Surgery, and Teacher of Operative Surgery at the Westminster Hospital; late Officer Commanding and Chief Surgeon Imperial Yeomanry Field Hospital, &c. &c.

It must necessarily follow from the attendant circumstances that surgical statistics and deductions collated by those working with a Field Hospital and Bearer Company will offer many points of contrast with those compiled at Stationary or Base Hospitals. The mortally wounded never reach these; and hence the surgeons in charge, dealing only with such cases as actually come under their notice, are likely to take somewhat optimistic views.

Optimistic views have, for example, largely prevailed among the profession and the public with regard to bullet wounds of the chest and abdomen; happily many such cases have made good and even wonderful recoveries, without apparent after ill-effects, but those who have actually done their work in the field are in a position to assert that there is a heavy, indeed an overwhelming, set-off against such fortunate cases.

There is, moreover, an essential difference in the work, and especially in the circumstances attending it, in Field Hospitals and in those on the Lines of Communication or at the Base.

In civil practice it is admitted that the surgeon *makes* circumstances, in other words he carries with him or has at his command such necessaries and facilities as will enable him to perform with every probability of success the most dangerous and difficult operations even in the humblest home. So is it in stationary hospitals; but if the surgeon expects that he will be able to work with the same advantage and security to his patients in the field, it will not be long before his hopes and aspirations are cruelly dissipated. This has been well exemplified in wounds of the abdomen. Those who thought that, because abdominal surgery had reached the perfection which it has, it could, in skilled hands, be employed in South Africa for the treatment of bullet wounds, have had to modify their opinions, and by bitter disappointment have learned that 'all depends on circumstances.'

The term 'Military Surgery' has unfortunately become a stock one; unfortunately, because it tends to convey the impression that there is some

subtle peculiarity about it, whereas there is nothing of the kind. Surgery in its principles is always the same whether in military or civil life; it is only the method of production of injuries and the circumstances of the injured which differ. But if by Military Surgery we understand that the injuries inflicted are produced under most adverse circumstances, which must modify our prognosis and treatment, and which will tax a surgeon's ingenuity and surgical instinct to the utmost, then there is no fault to find with the term, and it is in field hospitals especially that the resoureeful man will prove most useful. Field hospitals are at times so flooded with work that the surgeon has to consider how he may best serve the interests of the majority, and hence many prolonged and delicate operations, often, under the circumstances, of doubtful expediency at the best, are not undertaken. He has, moreover, to consider the patient's circumstances in the immediate future. Is it possible to leave him in the neighbourhood under skilled care? Must he be carried on with the column perhaps for days, or can he be at once sent to a stationary hospital? and if so, by what means, and how long will the journey take? Is the road good or bad? An answer to these questions will often determine the line of treatment almost as much as will the abstract physical condition of the patient. This is well exemplified in the case of badly comminuted compound fractures, the most difficult of all injuries to treat on the field. In such the surgeon who, in a field hospital, follows the abstract dictates of conservative surgery, which could safely and easily be followed in a stationary hospital, will court disaster. Ideal surgery is that surgery which saves the most lives and does the most good, and I have no hesitation in saying that when such a case has to be transported, perhaps for many miles over a bad road, in an ambulance or on an ox-wagon, amputation, although under more favourable circumstances the limb might be saved, is the wiser course. At the same time it is surprising what can be accomplished even with all the circumstances adverse, by a little energy, backed by a determination to do all that is humanly possible.

The following account of the surgery of the war is as seen by us, and it must be remembered that, if the ultimate history of cases to which I refer is incomplete or absent, such is due to the fact that our patients were sent down from the field as speedily as opportunity offered, and hence were, with few exceptions lost to us. At the same time we were fortunately able to see very numerous surgical cases in the base hospitals when we were temporarily in touch with them. At Reitfontein, by Uitval's Nek, to the western side of Pretoria, we were enabled to keep some of our cases under longer observation, since, after the reverse at Nooitgedacht in December, 1900, we were practically a stationary hospital for a month or so. I had further opportunities, by the courtesy of officers who were on column with us, of seeing many cases in the field which were not under our immediate care.

I further desire to state that we made only three post-mortem examinations of our patients, and did not inquire closely into the nature of the injuries of those who were dead on the field, or who died shortly after. If it be objected that such omission exhibits a lack of scientific enterprise, my answer is that, although I yield to none in my respect for science or in my desire to follow her leading, yet science must give place to humanity, and to those feelings of deep sorrow and respect which must ever be engendered in the minds of those who, in the field, have to look upon men mortally stricken in the service of their country; men who, perchance, were well known, respected, and admired by those who had to tend their last moments. Such are surely no subjects for scientific inquiry!

This report is divided into three parts, dealing respectively with (1) injuries by small arms and shell-wounds, (2) accidental injuries, and (3) surgical diseases not necessarily incident on war. The first part is naturally the longest, since most of our cases belonged to this group, and because wounds by modern small arms afford fresh material for observation and comment.

PART I.

General Points concerning Wounds Inflicted by Modern Small Arms.

The Lee-Metford and Mauser were the standard weapons of the British and Boer forces respectively, and hence our attention was principally directed to the wounds inflicted by them. The Martini-Henry, and, by the Boers, various modern and antiquated sporting rifles were also employed, but their use was only occasional, and hence the wounds caused by them need no special mention here, nor is it necessary to go into minute details as to the various points of similarity and contrast between the Lee-Metford and Mauser rifles, although a few words may not be considered out of place. The smallness of the calibre of these weapons increases the velocity of the missile, and hence increases its destructive power, in accordance with the law that 'if the velocity of a bullet be increased, its destructive power is augmented by the square of such increase.' But such increased power for evil is compensated for by the character of the modern bullet: the smallness of its tip limits its destructive area; the density of the mantle prevents its 'setting-up;' its lightness diminishes the stunning effect and stopping power; its ogival shape causes it to rotate in a plane at right angles to the line of flight, and hence it acts as a wedge, and cleanly perforates the tissues without being deflected from its path. The high velocity and penetrating power prevent (unless the bullet be nearly spent) its lodgment in the body, and also its carrying in portions of clothing, &c. It is

also to be borne in mind that most actions were at long ranges, usually from 1000 to 2000 yards, and hence, on striking, the velocity of the bullet was much diminished, although in most cases still sufficient to maintain its direct line of flight, and prevent its lodgment.

The question of velocity naturally leads one to consider that of range, and it is necessary here to insist that, in the vast majority of cases, it is quite impossible to gauge with any accuracy the range at which a wound was inflicted. The wounded man's statement on this point is practically never reliable. The manner in which the Boers fought, often in detached parties, their well-concealed positions and the employment of smokeless powder, all combined to render statements as to the range open to the gravest doubt, and in only a few cases could we arrive even approximately near the truth; and it must not be forgotten that the clear atmosphere of South Africa renders it most difficult to estimate distances except by those long resident in the country. It was within our constant experience, and no doubt within that of other medical officers in the field, that not infrequently the wounded man could not only tell you the precise range at which he was hit, but could indicate the very stone behind which the Boer was secreted, and, perhaps, with a little pressure, might have furnished his name and address. From many inquiries of wounded men, I have come to the conclusion that, as often as not, the British soldier estimates the range at which he was wounded by the sighting of his own rifle.

The following case, which came under my care, will illustrate this point:—

Case 1.—Pte. W. R., 2nd Batt. Dorset Regiment, was wounded at Almond's Nek. The bullet struck the buckle of his belt and passed into the abdomen in the middle line, close to the ensiform cartilage and lodged. The man repeatedly declared that he was struck by a Mauser bullet at a range of twenty yards, and nothing would shake his conviction on this point. I removed the missile from the left loin, just behind the kidney and about two inches from the surface. It proved to be the deformed half of a shrapnel bullet, and hence finally disposed of the man's assertion as to range.

When a bullet is nearly spent, there is, I think, no doubt that it begins to wobble from side to side like a top which has nearly done spinning, and under such circumstances the wound is somewhat larger and the bullet is likely to lodge, and if striking a resistant structure, such as a bone, to 'turn-turtle.' Some difference of opinion seems to exist as to the humanity, or otherwise, of the modern rifle. The answer must depend upon one's definition of the term humane; but there can be no doubt that the damage inflicted (speaking generally), and the suffering entailed on the wounded, is less than that occasioned by the Martini-Henry and older weapons.

To sum up the case for the modern small-bore rifle and ogival bullet, it

may be said that while the stopping power is slight and the wounded were often fit for the front again in a couple of weeks, both of which facts are to the enemy's disadvantage, the individual is the gainer, and for these reasons:—

(1) The wound is small and clean, quickly scabs over, runs an aseptic course, and heals rapidly and without pain.

(2) There is, as a rule, but little general shock. This matter is fully discussed on page 123.

(3) Lodgment, or 'setting-up' of the bullet is rare; as is also the carrying into the wound of portions of clothing, &c.

(4) The direct course taken by the bullet, and the rarity of its deflection.

It may be here conveniently noted that there was in many cases a marked contrast between the nature of the wounds inflicted, and often in their situation, in different actions. This contrast was in the main due to the different nature of the ground on which the action took place. Thus, for instance, on rocky ground the number of wounds by deformed ricochet bullets would be large, whereas in more open country it would be insignificant, and hence one man's experience of a hundred bullet wounds in a given action would probably contrast strikingly with that of another whose experience was gained under different conditions.

The Immediate Effects of Bullet Wounds.

It was very noticeable in the field that pain and shock were, as a rule, but little marked; indeed, patients not infrequently walked into the hospital camp apparently quite unconcerned, even after a bullet had passed through the thigh. The degree of *pain* varied according to the nature and position of the wound; upon whether bones or nerves were involved or not, if so, to what extent; and also upon the individual temperament of the man. Some men with quite superficial wounds complained greatly, while others, even with severe damage, hardly complained at all. Generally speaking, wounds inflicted by spent bullets, or by shrapnel, caused the greatest pain—they were the most severe. In reference to this subject, I must pay a well-deserved tribute to our patients' pluck and endurance. Tommy, almost invariably, belittled his sufferings, took things cheerfully, and showed a consideration for his wounded comrades which filled us with admiration. The nature of the pain experienced at the time of being wounded was variously described; but for the most part it was said to be like that inflicted by a sharp cut with a stick, and in some cases like a heavy blow by a hammer. Some men said they had been 'winded.' In not a few cases the patients did not feel pain, and only discovered that they had been wounded in quite a casual manner. It is also to be noted that most flesh

wounds ran, so far as we saw, a painless course throughout, unless a nerve had been damaged or a bullet remained embedded. Lodged bullets rarely caused more than inconvenience, and this only if so superficially situated as to be subjected to pressure.

As regards *general shock*, we found it very slight and in the majority of cases quite absent, except in such as were wounded in the abdomen, chest or head, when it was of course severe. The prevailing absence of shock was doubtless mainly due to the light weight of the projectile, and its consequent slight stunning power, in addition to the extremely simple nature of most flesh wounds. The degree of general shock, however, like the pain, varied much with the individual: thus in some cases in which the severity of the wounds (inflicted under similar circumstances and in the same action) was almost equal, one patient would show unmistakeable signs of general shock, whereas another treated the whole matter lightly, and only wondered how long respite he would get from the constant trekking. It suggested reactionary shock, *i.e.*, shock induced in a man of highly-strung nervous temperament at the infliction of an injury the possibility of which had stared him in the face day by day, but the severity of which he did not know and was likely to exaggerate, for most of these cases complained of considerable pain even with slight wounds, and probably mentally estimated the severity of the injury by the degree of pain. Being wounded the state of mental tension was, for the time at least, relaxed, and was followed by a condition of more or less pronounced nervous collapse. All those who have been on column week after week, month after month, often in bad weather, with indifferent and monotonous diet, surrounded by invisible snipers, and in constant expectation of an engagement, will know quite well the mental condition to which I refer, and which was perhaps best expressed by saying that a man 'had the jumps'; nor is it difficult to understand that such a one should experience a degree of shock from even a slight injury which would be treated cavalierly by a more phlegmatic man. Yet in other cases—and I refer here to some of our patients who were very severely wounded about the limbs—this mental expectancy had the opposite effect, the infliction of the daily expected injury leaving the nervous system in a state of complete tranquillity, a condition favoured perhaps by the knowledge that the wound was not mortal. Every surgeon is familiar with the fact that many patients who have looked forward with dread to an operation prove the best when the time comes and suffer least from after-shock, while the converse is equally true. While on this subject I may refer to the question of the advisability of picking up wounded men on the field during an action or allowing them to remain undisturbed until it is over. I believe that the latter is the more advisable course in the patient's

interests, and I do not think that lives would be lost by its adoption. After the action at Nooitgedacht, in the Western Transvaal, some of our patients were not picked up until the fifth day, and many of them not until twenty-four or forty-eight hours, and yet in no single instance did we find a man who had seriously suffered therefrom.

It is true that many of the wounds were suppurating and not a few were full of maggots, but the injuries were of such a nature that suppuration would (in the vast majority at least), have ensued in any case, and as for the maggots, they, although disagreeable guests, mattered but little, and were speedily got rid of. To show the straits some of these men were put to, I may mention one case.

Case 2.—Pte. J. B., 2nd Batt. Yorkshire Light Infantry, was wounded at Nooitgedacht, December 13th, 1900, and was not picked up till December 17th. He had a badly comminuted fracture of both bones of the right leg in the lower third. He told us that he had been unable to move, and after emptying his water-bottle and eating what biscuit he had, he was compelled to eat grass and drink his own urine. Just when he was found he had made up his mind to drag himself along in search of water. This man's condition was quite good, and although his wound was in a very bad state, I am glad to say we were enabled to save the limb.

There is no doubt that in cases of wound of the abdomen and chest with possible internal hæmorrhage, immediate movement is contrary to the patient's interests, which are best consulted by allowing him to remain undisturbed for some hours.

If it be conceded, and I feel that most of those who have been with a Field Hospital or a Bearer Company will concede it, that if anything the interests of the wounded are best served by allowing them to remain on the field for some time, I may point to other advantages which this plan would secure. In not a few instances in this campaign, some of which have come under our own notice, a group of stretcher bearers attracted the enemy's fire, and some of them were wounded; in some cases the patient himself was hit again, and in one we saw the patient was killed. No one would for one moment wish to keep the surgeons and bearers from the field if necessity demanded their presence, but this is equally to be deprecated if non-essential, for it is not only useless but foolish to expose unarmed men to a fire against which they cannot defend themselves, and which may seriously reduce the ranks of those, already too few in number, whose object is to succour their unfortunate comrades.

Local shock in simple wounds of soft parts, was hardly ever noticed, but in cases of fracture it was pronounced, as will be further referred to under bullet wounds of bones (page 145). *Hæmorrhage* was as a rule very slight, indeed, in simple flesh wounds through the limbs, one might almost say that the amount

of blood lost was not more than a few drops: this was of course due to the small size of the wound. In only a few cases did we meet with anything like severe bleeding, and the use of a tourniquet was a rare event (see page 152).

Simple Flesh Wounds.

In many cases the wounds made by *undeformed* bullets striking at a right angle were so small and trivial, that the apertures had to be carefully sought for especially in parts of the body, *e.g.*, the buttock, where natural folds readily concealed them. The apertures of entry and exit were frequently quite indistinguishable, and it remained matter for doubt from which side the man had been shot, as the patient's statement on this point was not reliable. In other cases, of course, the indications were clear, and especially so when the bullet had struck obliquely. The typical wound of entrance was circular, not larger than an ordinary penholder, and usually somewhat depressed. When quite recent, the aperture, if it can be so called, was surrounded by a narrow zone of a greyish-white colour, looking as if the margin had been superficially charred, this was about one-sixteenth of an inch in breadth; in a few hours this zone assumed a livid tint quickly succeeded by the red colour of congestion. Bleeding was very slight and there was rarely any surrounding ecchymosis or bruising. The mouth of the wound quickly became covered with a dense, closely adherent, almost leathery, dark brown scab, which gave the wound the appearance of a healing vaccination mark. When healed, such a wound appeared as a small, slightly depressed scar not much larger than a split pea, in many cases it was linear.

The exit wound, as already said, might be quite indistinguishable from that of entry, but in most cases it was more or less starred and wanted the greyish zone already mentioned; in other cases it was a short slit, either quite straight or slightly curved, and sometimes a pellicle of fat protruded between its margins. The exit wound was, however, sometimes large and ragged, with torn and lacerated fat or muscle projecting—such were, however, only seen when in its passage through the limb the bullet had struck a bone, driving splinters into the soft tissues and becoming itself deformed; but even when a bone had been considerably damaged the wound of exit might be quite small. The track of an undeformed bullet between the aperture of entry and exit was practically always quite straight, provided, of course, the patient was placed in the position he occupied when struck, and it was surprising how structures of the most vital importance escaped damage, especially in view of the fact that the track of the bullet was somewhat larger than its aperture of entrance. If during its passage the bullet met at any part of its course with

increased resistance, this lateral enlargement of the track became very noticeable, as was well exemplified in cases of comminuted fracture of the femur or humerus: doubtless this was due to two causes, the diffusion of force and the splintering of the bone, the fragments of which, endowed with energy, added to the damaging force. Although the track was, in the vast majority of cases, quite straight, yet we saw cases in which the bullet had been deflected in its course, doubtless owing to its low velocity.

Case 3.—Lieut. S. (Cameron Highlanders) was struck by a Mauser bullet a little to the right of the middle line, about two inches below the ensiform cartilage. There were no abdominal symptoms, but complaint was made of some pain in moving the right leg. The undeformed bullet was removed from the thigh, where it had lodged beneath the skin about a hand's breadth below the groin on the outer and posterior aspect. It had apparently passed along the psoas muscle. The wounds healed quickly, but convalescence was retarded by left-sided parotitis, the only case of parotitis complicating abdominal injury which I have been able to hear of.

When the track of the bullet was subcutaneous ('seton-wound'), its passage between the two apertures could often be plainly seen as a bruised, discoloured track, considerably broader than either aperture. On palpation, such a track gave a peculiar sensation to the finger, which is very difficult to described in words—it seemed to be a mixture of the sensations conveyed by surgical emphysema and œdema.

Case 4.—Of this we saw the best example in the case of a native who was struck just below the crest of the left ilium. Taking a V-shaped piece out of the crest, the bullet (Mauser) passed upwards subcutaneously as high as the axilla, where it fractured the third rib and entered the chest. The subcutaneous path was indicated by a livid mark about three-quarters of an inch broad. When we sent the man by convoy some five days later, the track was indicated by a broader bruise, but there were no inflammatory signs and no chest symptoms.

When a bullet struck the body at a tangent, the wounds inflicted varied considerably, and were larger. The entrance wound was more frequently starred, and the exit wound appeared as a ragged slit, measuring perhaps an inch or more in length. In many cases we found that the bullet after escaping had scored the skin for some distance beyond, and such 'brush-burn' wounds were also occasioned by glancing bullets without any penetration. It is interesting to note that such grazes often led to localised acute inflammation and subsequent sloughing of the skin, this process extending a short distance beyond the part with which the bullet actually came in contact.

Multiple Wounds.—An examination of our cases shows that in sixteen per cent. we had to deal with multiple wounds, the apertures of entry and exit being, of course, always regarded as one wound. No doubt the magazine rifle (especially the Mauser, which has no cut-off) was in great measure responsible for this, but in some cases it was clear that the wounds had been made by the same bullet.

Thus we saw cases in which a bullet had passed through both thighs, legs, or feet, or through the arm or chest.

Case 5.—Trooper W. J. H., 3rd N.Z.M.R., was wounded at Middlewater on August 1st, 1900, while running to cover. The bullet entered the right buttock four inches behind and one inch below the top of the great trochanter, and escaped one inch external to the upper anal margin, entered the opposite buttock rather below the anal margin, and traversed the thigh, escaping on its outer side seven inches vertically below the top of the great trochanter. Another bullet track passed subcutaneously for about an inch and a half close to the left gluteal fold, so that this man showed six bullet apertures.

Progress of Simple Flesh Wounds.—Simple flesh wounds, made by undeformed bullets, almost invariably pursued a painless aseptic course, and healed soundly within a few days. The resulting scars were quite small, supple, and slightly depressed; sometimes there was slight induration felt along the bullet track. Healing took place under a dense leathery scab, which could only be removed with difficulty. The aseptic course of these wounds was a very noticeable feature, especially when it is remembered that the skin and clothes of men on column are usually far from clean. The asepticity was dependent upon a variety of circumstances. The small size of the wound, and extreme limitation of the damage with absence of bruising, entailed practically no reactionary inflammation, and hence there was no discharge which would furnish a culture medium for saprophytic or pathogenic organisms; moreover, the rapid scabbing of the apertures of entry and exit excluded the air and protected against contamination from without. Further, the bullet having its surface renewed on leaving the muzzle of the rifle, was practically sterile, and, as has been already stated, portions of clothing or foreign material were hardly ever driven into the tissues. The dryness of the air, and the fact that the men were for the most part in excellent health, also contributed to the rapidity of repair and recovery. Suppuration did, of course, occur in some cases, but it was rarely severe or widespread, and usually only affected the mouths of the wounds, except in those rare cases in which a bullet or some foreign body lay in the track. The mere fact of retention of a bullet did not, however, by any means entail inflammation or suppuration, and we saw many cases in which the wound healed as rapidly and kindly with a retained bullet as without.

In looking through our cases, it is noticeable that wounds of the feet more frequently gave trouble than did wounds elsewhere, a fact not perhaps to be wondered at when one reflects that the feet were by no means the cleanest part of the body of most of our patients. After the action of December 13th, 1900, at Nooitgedacht, we saw suppuration in a considerable number of cases, but it must be remembered that, with the exception of the first field dressing, hastily, often inefficiently applied, many of these men did not receive adequate surgical

attention until from two to four days after they had been wounded. Spreading cellulitis and lymphangitis were decidedly rare. We only saw two cases, one following a clean perforation of the leg, and the other a perforation of the tarsus: in both cases the disease was quickly arrested by free incisions and hot fomentations.

The course of wounds made by deformed bullets was naturally not so favourable, and yet the majority of these healed without suppuration, although they frequently left some stiffness behind them. When suppuration did occur, it was usually slight, and repair quickly set in after the wound had been slightly enlarged and cleansed. The following case is typical:—

Case 6.—Trooper J. F., 14th Co. I.Y. A Mauser bullet struck the stock of his rifle, glanced off, and entered the middle line of the thigh, about four inches above the patella. The wound was lacerated and bruised, and the deformed bullet was found at the bottom of it. Three days later, the wound having suppurated, was enlarged, when the inflammation rapidly subsided, and granulation was active three days later.

Treatment of Simple Flesh-wounds.—Each soldier in the field carries on him the first field dressing, which is issued by the Clothing Department, and is placed in the pocket on the inner side of the right-hand side of his tunic. In the event of a man being wounded, he, a comrade, or one of the medical staff, applies this dressing to the best advantage, and it is only removed when the man can be more carefully attended to in the field hospital. In many cases the wound was first covered with some antiseptic powder, usually iodoform—this practice is doubtless good, but iodoform is certainly not the best powder to use, its antiseptic properties being very slight. I think boracic acid, or the powder of the double cyanide, much preferable. It will be convenient here to detail shortly the method we adopted in dealing with our patients in the Field Hospital. On the arrival of patients they were sorted by the medical officers, and were sent into the operating-tent in order according to the severity of the case. Those who would not need chloroform were at once fed. Each patient was examined carefully, the first field dressing was removed, the parts thoroughly washed and cleansed on antiseptic principles, the nature and extent of the injury ascertained, and the wound treated according to its nature. In all we did we strove to carry out aseptic treatment; but it is necessary to point out that ideal aseptic surgery could not be carried out in the field: frequently the wind was high, and clouds of dust penetrated the tent and covered everything. At the same time the precautions we took were the best possible under the circumstances; and the course taken by the wounds showed that, although our conditions were by no means without fault, these precautions answered the purpose in a highly satisfactory manner. We always had an ample supply of boiled and filtered water with which to wash the region of the wound and to make our lotions. The

general management of the operating and dressing tent was at all times most ably looked after by the surgical dressers under Sergeant Jeffreys, and to these gentlemen the patients and surgeons owe a debt of gratitude. Simple flesh wounds were dressed with double cyanide gauze and salicylic or alembroth wool, and the dressings were left undisturbed unless pain, fever, or discharge demanded a re-examination of the wound. Embedded bullets were only removed when they could be felt by the finger at the bottom of the wounds, or were found projecting beneath the skin at a distance. Under no circumstances was any operation undertaken to seek for such bullets. Such a procedure is to be condemned, for the mere fact of lodgment of a bullet is not a matter of immediate importance; it can always be localised and removed after the patient has reached the stationary or base hospital, where the facilities for operating and the possibility of carrying out strict asepsis are far superior to those in a field hospital. In such cases as were suppurating our usual plan was to enlarge the wound sufficiently to ensure free drainage, thoroughly irrigate it with carbolic or mercuric lotion, and apply an antiseptic dressing or hot boracic fomentation according to the limitation or severity of the suppurative process.

Injuries by Deformed and Expanding Bullets.

Deformed Bullets.—The Mauser bullet, because its mantle is less dense, more readily undergoes deformation either inside or outside the body than does the Lee-Metford. Malformation of a bullet may be due to its impact against a bone; but, in the great majority of instances, it was caused by the bullet having struck a rock or stone, and hence such malformation was more commonly met with in some actions than in others—thus at Nooitgedacht, where the fighting took place on a very rocky kopje, deformation of the bullets was common, whereas in the fighting which took place on our advance to Rustenburg, early in August, 1900, we saw no case of deformed bullet. The commonest deformity we met with was a slight lateral twist of the end third of the bullet which was somewhat flattened and consequently broadened; such bullets were also sometimes deeply scored by contact with rock or stone, and such scoring might be the only deformity present. In cases of fracture also we found bullets deeply grooved, probably by glancing off the bone. Not only did such deformity increase the severity of the resulting wound, but the manner of its production caused the bullet to ricochet and hence to strike obliquely, sideways, or base first, and thus to inflict greater damage. In some cases we found that the mantle was torn and 'set-up' from apex to base in such a manner as to strongly suggest that the point had been filed down until the leaden core was exposed, which would then mushroom, pancake or split up

into fragments. In other cases we only found the fragments of the core in the wound, the mantle not having penetrated or having dropped out of the larger aperture. Ricochet bullets also sometimes had the mantle torn longitudinally beyond the apex, which was still covered.

Expanding Bullets.—That expanding bullets have been used during the South African campaign there can be no question, but from what we saw I think that their use has been much exaggerated. Of the numerous wounds we saw, there were very few which we could feel certain had been made by such missiles, for it must not be lost sight of that a normal bullet may become so deformed, or even 'set-up' by contact with a stone, that it will inflict a very serious wound. Of such cases we saw a good number among the British and some among the Boers who had been wounded in the action at Nooitgedacht, on Dec. 13th, 1900. I availed myself of numerous opportunities of examining the bandoliers of Boer prisoners and captured ammunition, but found very few bullets which had been tampered with. The commonest method of making a bullet 'set-up' was to remove the mantle from the tip, or simply to file off the end so that the leaden core was exposed. Sometimes the mantle was slit in four places down the sides (Jeffrey's bullet), and this proceeding was occasionally combined with filing the tip also. Such bullets were sometimes used for sporting purposes. The object of filing the nose of the Mauser bullet was to expose the leaden core and make it 'set-up' on striking, when the mantle would buckle-up, and thus to increase it area of impact, and hence a very severe wound would be produced. Such bullets will be likely to lodge, and their stopping power is much increased, consequently the resulting shock is greater, and the wound is likely to suppurate; convalescence would thereby be much retarded, even if the wound itself did not entail some mutilating operation or even more serious consequences. The Martini-Henry is itself an expanding bullet, and although we did not see any such, we knew from the experience of others that the Boers sometimes resorted to the plan of cutting them at the tip, either singly or crosswise, for the depth of about the eighth of an inch or more. The Martini bullet is a very formidable destructive agent, making a large ragged wound, and severely lacerating all structures.

Nature of the Wounds.—It is of course quite impossible to give more than the broad general features of wounds made by these missiles; they differed considerably in extent and severity according to the form of the bullet and the degree of its deformation. Generally speaking such would resemble in type, though of course not in extent, those produced by shells; they were ragged, lacerated, bruised, and sometimes extensive; the muscles were often pulped, and the damage to bones extensive—thus in the case of a Boer the heel had been nearly blown away and the

os calcis was extensively comminuted. The following case illustrates the nature of the injury afflicted by an expanding bullet:—

Case 7.—Pte. D., 3rd Batt. Mounted Infantry, was wounded at Rietfontein (6) in July. Entrance wound on anterior surface of the middle of left forearm just to the ulnar side of the radius. The wound was ragged; measuring in the centre three-quarters by half an inch, from this point it was continued upwards and downwards as a linear tear, being about four and a half inches long. The wound of exit was on the dorsal surface over the ulna, and measured four by two inches. The skin over this part of the arm was blown away, the extensor carpi ulnaris and extensor communis were much lacerated and projected through the wound; part of the muscular substance had been blown away. The ulna was severely comminuted, but there was no detached fragment. The arteries were intact, but there was considerable venous bleeding and also oozing from the muscles.

Spent and Retained Bullets.

Considering the characteristics of the Lee-Metford and Mauser bullets, and their high velocity, we found a considerable number (rather over 10 per cent.) embedded in the tissues. This was due to the fact that men were struck at long ranges, for no normal bullets, unless spent, were retained. Even at comparatively short ranges a bullet was sometimes retained, but in such cases there was evidence, from its deformation, that the bullet was a ricochet and had consequently lost momentum. In such cases, we occasionally found only portions of the core of the bullet, the casing having set up; in all these, the wounds were quite superficial. It was noticeable that wounds made by spent bullets were often much bruised, and not infrequently caused pain out of all proportion to their severity.

Case 8.—Pte. P. G. A., Imperial Light Horse, wounded at Middlewater, August 1st, 1900.—A spent Mauser struck the forearm, inflicting a wound measuring three-quarters by half an inch, but only penetrating for half its length, the projecting bullet being easily pulled out by the patient. The edges of the wound were ragged and contused, and there was extensive bruising for some distance round with considerable effusion and pain.

The situation of an embedded bullet, in the absence of the X-rays (which we could not use in the field) was often very doubtful, but this was not a matter of any material importance, since such bullets were only removed in the field under special circumstances.

Foreign Bodies in Wounds.

As would be expected, when the small size and high velocity of the modern bullet are taken into account, the discovery of a foreign body in a wound was very rare.

Case 9.—Capt. S., Cameron Highlanders, was struck on the right shoulder, the bullet escaping by a large ragged wound over the deltoid just below the end of the acromion process; the

wound healed by granulation without trouble, and it was not suspected that there was any foreign body in the tissues, although the bullet had passed through one of the stars on the shoulder strap. Some months afterwards I had an opportunity of seeing this gentleman, and found a small portion of the metal star beneath the skin some little distance from the wound.

The most remarkable case of this nature which we saw, was that of the native whose case (No. 29) is quoted on p. 141.

An accident of somewhat common occurrence was occasioned by carelessness or a foolish practical joke, viz., a cartridge in the fire. In such a case the bullet does not fly, at least I never saw or heard of an instance in which it had done so, but the case, splitting up into small jagged and twisted fragments, does fly, and we saw instances in which the pieces were embedded in the subcutaneous tissue, the skin being the seat of a small contused and irregular wound.

Portions of shell frequently lodged, as in the following instance :—

Case 10.—Pte. W., Shropshire Light Infantry, wounded at Rhenoster River, June 7th, 1900, a fragment of segment shrapnel was embedded in the angle of the jaw on the left side. The bone was broken, but the cavity of the mouth was not opened. The portion of shell and one small piece of stone were removed, and at the bottom of the wound, firmly rammed home, was a considerable quantity of the Balaclava helmet, which the man was wearing, pulled down on his chin and rolled up at the bottom. This case suppurated and the wound became sloughy, but when the man was sent down to Kroonstad, the inflammation had subsided, and granulation had begun.

When fighting took place on very stony ground, it was not uncommon to find that shrapnel bullets split upon the rocks, and minute fragments of both bullet and stone became embedded beneath the skin. I remember one case particularly in which the right side of a man's abdomen and the upper part of his thigh were covered by minute wounds, in many of which small pieces of stone were found ; the general appearance was as if he had been struck by a charge of small shot from a fowling-piece. Such injuries as these were, however, never serious, and the patient usually returned to duty in a few days.

Bullet Wounds of the Head.

Wounds of the head were common, and all were regarded as serious, no matter how trivial they might appear on superficial examination. The severity of the injury was naturally greater the more nearly the bullet struck at a right angle, but even glancing wounds inflicted severe damage to the skull and its contents. Simple scalp wounds were frequently accompanied by loss of substance as if a piece had been cut out with a gouge, such wounds had usually bruised and shelving edges : they always suppurated. In some of these slight cases the patients complained of having been 'knocked silly' at the time, but in only one did we observe any cerebral symptoms accompanying a simple scalp wound without fracture.

Case 11.—Trooper H. B., 12th Company I. Y., was wounded at Rhenoster River on June 11th, 1900. There was a triangular scalp wound two and a quarter inches above and behind the left external angular process. The bone was intact. There was slight aphasia with paresis of the right arm, but no irregularity or loss of mobility of the pupil or loss of consciousness. The next day there was improvement in the aphasic condition, but none in the arm; and the left facial muscles were paresed. This patient was sent down by convoy to Kroonstad on June 14th; the aphasia was still improving, but the paresis was *in statu quo*. This condition was doubtless due to contusion of the brain.

Glancing bullets very frequently caused gutter fractures, and I saw two cases in which the outer table was the only one implicated; more usually both were damaged, the superficial area of the injury being greater on the outer table, although, of course, the gravity of the condition depended on the state of the inner.

Case 12.—Trooper A., 79th Company I. Y. (Rough Riders), Mauser wound at Shangani Rest, September 9th, 1900. When hit he was sitting up in the act of firing. The wound of entry, about a quarter of an inch in diameter, was circular, and was situated two inches behind the exit wound, which was two and a half inches above the left mastoid process: the exit wound measured one inch from before back and a quarter of an inch from above down; the edges were shelving and much contused. The bone beneath the exit wound was scored by the bullet. Under chloroform the wounds were laid into one and the bone examined; there was a short gutter fracture of the outer table, but the inner was intact; some small fragments were removed and the wounds closed. The patient did well from the first.

Case 13.—I saw a very similar case to this at Rietfontein. An officer had been hit much in the same place by a glancing bullet, he had some difficulty of speech and weakness of the right arm, but no loss of consciousness. On examination under chloroform it was found that the outer table had been damaged, but the inner was intact; it was concluded that there was some bruising of the motor area. This patient I had the opportunity of watching for some weeks, as he came down to Cape Town with me. The speech improved rapidly, but the arm, although better, did not completely recover, and I have heard since that it is by no means well even now (1902). This officer had also several slight flesh wounds of various parts of the trunk and limbs. He was wounded at Nooitgedacht, December 13th, 1900.

The danger of gutter fractures necessarily depends upon the damage to the inner table, and the concomitant laceration of the dura and brain. Those we saw were, on the whole, very favourable compared with the damage done (over the same area) by glancing portions of shell.

Case 14.—The following case I was asked to see by Captain Probyn, R.A.M.C., at Reitfontein. A man of the 2nd Northumberland Fusiliers had sustained a severe fracture from a glancing bullet over the right parietal bone, just below the eminence. The fracture implicated an area about the size of a shilling. Many small fragments had been removed, and the brain, covered with healthy granulations, was protruding slightly and pulsating freely. The man himself was quite well when I first saw him, a week after the injury, and subsequently recovered completely; at least, a month later the wound had healed, and no untoward symptoms had made their appearance. I have, however, seen an almost precisely similar case lately, in which paretic symptoms made their appearance six months after the infliction of the injury.

Bullets striking the skull more nearly at a right angle of course penetrated, and the danger to the patient's life, and the prognosis as to the future general condition, varied, *ceteris paribus*, with the part of the brain damaged. Wounds in the posterior segment and at or near the base were necessarily the most dangerous, and many men killed outright on the field were so struck. At the aperture of entry the scalp and bone were usually cleanly drilled, small fissures radiating from the bony margin. In many cases the aperture of exit was easily determined by the larger size of the wound and the greater damage to the bone, the fragments of which were driven outwards. In only one case did we meet with a lodged bullet, and in this it is worthy of note that the wound of entry in the bone was cleanly drilled. There was no fissuring, nor was the damage to the inner table greater than that to the outer.

Case 15.—Trooper A. V. E., 79th Co. I.Y. (Rough Riders), Mauser wound, Shangani Rest, September 9th, 1900. The wound of entry was quite typical, and was situated three inches above the tip of the left mastoid process; no exit. The patient was unconscious, and breathing stertorously, pupils equal and slightly contracted, convergent strabismus, slight twitching of the right arm. The scalp wound was enlarged, and the circular clean perforation of the skull examined. Two or three minute fragments of bone were removed; there was no fissuring and no depression of the inner table. The pulse was 62, and a few hours after being wounded the temperature rose to 103°, and remained high; the pulse also quickened, and became full and bounding. The patient was fed *per rectum* and by a tube through the nose. He never regained consciousness, but died on the morning of the 12th, when we arrived at Tafel Kop. On examination the parietal bone was found to be clean drilled, the inner table not being damaged more than the outer. The bullet was found lying in the right middle fossa; its track through the brain was marked by pulping and ecchymosis; there was no inflammation. The lateral ventricles contained bloody fluid, and there was localised hæmorrhage beneath the dura.

In another case in which the man was struck on the right parietal region behind the eminence, the bullet emerging just above the left ear, there were practically no symptoms after forty-eight hours of semi-unconsciousness, and when, at the request of Captain Probyn, R.A.M.C., I saw the man seven days after the injury, he, on my approach, sat up and saluted. On inquiring into his case he said he was all right, and had only one complaint to make—he was not permitted to smoke!

From the conditions of our work in the field, although we saw numerous cases of head injury, we had no experience as to the frequency of sequelæ, and therefore any statements on this point would be out of place in this report, but it is well known that mental and motor changes sometimes supervened, and that cerebral suppuration eventually carried off many of the cases.

Treatment.—In the field we always adopted the same plan, no matter how trivial the injury appeared. The scalp was shaved and thoroughly cleaned; the wound was examined, and, if needful for thorough investigation, enlarged. Fracture

was negatived, or, if found, its nature and extent were made out, and bone removed if necessary. When the dura was damaged, the wound in it was further enlarged, so that the condition of the brain and the presence or absence of local bleeding could be ascertained. When the ordinary principles of surgery had been complied with, an antiseptic dressing was applied, and not changed unless circumstances indicated. All head injuries, however trivial they might appear, were sent to the base by the first convoy.

Bullet Wounds of the Face and Neck.

Wounds of the Face derived their chief interest from the damage inflicted on the jaws, the orbit, or the globe. Such cases as we saw inflicted by bullets were, with one exception, not in themselves dangerous; most of them were simple gutter-wounds, made by glancing bullets, and quickly healed without trouble, Case 44, page 152, is a good instance of the damage inflicted on the lower jaw. In another instance a man had both his antra cleanly perforated by a bullet crossing the face; practically the only symptom he had was slight epistaxis immediately after the injury. The following case is of interest:—

Case 16.—An Officer, while carrying a wounded sergeant to a place of comparative safety, was struck by a bullet, which cleanly drilled his nose through the alæ; it then entered the sergeant's skull and killed him immediately. The nose healed within a few days under a collodion dressing, with small gauze plugs in the nostrils. (Roodewal, June 7th, 1900.)

In only one case did we meet with an injury causing destruction of the globe, and this by concussion.

Case 17.—Pte. D., 2nd Northumberland Fusiliers, was wounded by a Mauser bullet at Nooitgedacht, on December 13th, 1900. The bullet struck him half an inch behind the outer angle of the orbit, making a seton-wound half an inch long; it then ploughed up the skin of the lower lid and scored the left side of the bridge of the nose. The globe was damaged by contusion, the inferior semi-circle at the corneo-sclerotic junction being ruptured. The contents of the globe were escaping. As the flesh wounds were foul and suppurating the globe was not removed, but its contents were evacuated to relieve the pain, and the patient was sent to Pretoria.

Wounds of the Neck.—Of these we saw some extremely interesting cases, interesting mainly on account of the escape of structures which lay in the direct path of the bullet. In most cases the bullet track was antero-posterior, with slight obliquity; in many it was transverse. In both directions we saw instances in which practically no damage had been inflicted beyond a mere perforation.

The following case is an instance of such a condition, the trachea however was evidently bruised:—

Case 18.—Pte. F. E. B., 2nd Northumberland Fusiliers, was wounded at Nooitgedacht, on December 13th, 1900. Entrance in the middle line, just above the supra-sternal notch; exit an

inch and a quarter below the centre of the spine of the right scapula. At the time of the injury the patient spat a little blood, and soon after his voice became hoarse and weak. There was also a persistent hacking, brassy cough. No emphysema and no alteration in the trachea felt through the neck. Vessels and nerves intact. This man was doing well when sent to Pretoria; the hæmoptysis had stopped, but the condition of the voice was not improved.

Of actual perforation of the trachea we only had one case, which unfortunately terminated fatally.

Case 19.—Pte. C., 4th Derby Militia, wounded at Roodewal, June 7th, 1900. The bullet entered immediately above the inner end of the left clavicle, divided the sternal head of the sterno-mastoid, and damaged the trachea. There was emphysema extending upwards on the left side to the level of the ear, and downwards over the chest to the umbilicus. The bullet had lodged, but its situation could not be ascertained. The wound in the neck was enlarged, and subsequently tracheotomy was performed, but the patient sank and died three days after the injury. There were no pulmonary complications, death being due to heart failure.

We had no instance of wound of any of the large vessels of the neck, nor is this surprising, since such prove immediately fatal, as we had opportunities of seeing. Yet, no doubt, some of these apparently harmless wounds, traversing the line of the large vessels, have been subsequently followed by aneurysm; as, indeed, I know happened in two of our cases. I have also had the opportunity of seeing such a wound leading to the formation of a large varicose aneurysm between the left carotid and internal jugular.

Cases of injury to the nerves of the neck are considered under wounds of these structures. The following case is of interest, as it appears to me, and to others who saw it at the time, to be one of damage—bruising—to the right recurrent laryngeal. It resembles, in some respects, Case No. 18, but wants the bleeding, &c., which in that pointed to tracheal damage.

Case 20.—Driver T. R. T., 'P' Battery, R.H.A., was wounded in the Heekpoort Valley. The bullet entered about an inch, vertically, above the right sterno-clavicular joint, and escaped two inches above the spine of the scapula in the line of its vertebral border. Directly after the injury there was marked aphonia, but no bleeding from the trachea and no evidence of damage to it. The cutaneous sensation of the upper limb was perfect, but there was paresis of the deltoid, latissimus dorsi, and teres major muscles, and of the flexors of the elbow joint.

Bullet Wounds of the Back and Spine.

Flesh wounds of the back were by no means uncommon. Most of those which we had an opportunity of seeing ran from the region of the shoulder downwards, with slight obliquity; the men being struck while firing in the prone position. In some instances the track extended into the lumbar region. Rarely was it shorter than six inches. In some it was subcutaneous, but when long,

the muscular substance was also traversed. Such wounds presented no peculiarities. The gravity of injuries to the spinal column necessarily depended upon concomitant damage to the cord and nerves. The cases we saw all died when the symptoms indicated a cord lesion; but in two cases where it seemed probable, though in the absence of the X-rays not certain, that the bullet had lodged in the body of a vertebra, the patients were doing well when sent down by us. In one case in which a post-mortem examination was made, the spinal cord was found to be completely divided, but the tough dura mater was intact. This man had been wounded at Nooitgedacht, on December 13th, 1900, the cord being severed at the level of the sixth cervical vertebra. He lived eleven days. Cystitis made its appearance within a couple of days of the injury, and soon after acute bed-sores and trophic lesions set in. His condition on admission to the Field Hospital was truly pitiable.

Bullet Wounds of the Chest.

What has already been stated with regard to simple flesh wounds applies to non-penetrating wounds of the chest, but it was especially in this region that we saw very long tracks which often ran subcutaneously, not infrequently passed to or from the abdomen, and were indicated by a livid line on the surface.

Case 22.—Basuto Driver Felis, wounded at Rhenoster River, June 7th, 1900. The entrance wound was two inches below, and the same distance behind the left anterior superior iliac spine; the track of the bullet (clearly indicated by a discoloration of the skin about three-quarters of an inch broad) passed upwards to the axilla. There was slight hæmoptysis, with a very troublesome hacking cough, and there was slight emphysema over the chest at the axilla, but no fracture of the ribs could be made out. There was considerable pain in the subcoracoid region, especially on pressure; this radiated down the arm. There was marked weakness of the deltoid, triceps, pronators and supinators of the forearm and of the flexors of the fingers. The chest symptoms had considerably improved, but the state of the muscles remained the same when the patient left for Kroonstad on June 14th. The bullet could not be detected, but it seemed evident that it had split up either against the crest of the ilium (which was smashed) or against the ribs; probably the former, as there was no evidence of damage to the latter. Fragments entered the chest, and evidently also the brachial plexus.

We did not see any case in which the ribs were broken without penetration of the chest, but we saw several of perforation of the scapula, especially near its vertebral border; in none of these was the bone comminuted.

Penetrating Wounds of the chest were quite common, and were the most interesting class of injuries on account of the little damage usually inflicted, the comparative absence of symptoms, the rarity of serious complications, and the extremely favourable course which such cases pursued. Bullets traversed the chest in all directions, antero-posteriorly, obliquely, laterally, and vertically, and in the

last direction not infrequently passed into the abdomen. The direction of the track depended, of course, upon the position in which the patient was when struck, and as the prone position was a very common one, vertical tracks were common, and were the most dangerous in consequence of the frequency with which the abdomen was implicated.

Case 23.—Sergt. C., Kitchener's Horse, was wounded while lying down firing. The bullet entered the right side of the chest, three inches below the junction of the outer and middle thirds of the clavicle, and escaped in the right lumbar region, directly below the twelfth rib, and two inches from the spine. The exit wound was ragged, and measured two inches by one inch; there was slight emphysema round it. This patient spat a little blood directly after the injury only; there was dulness at the right base, and respiration was shallow. When we sent him into Pretoria he was doing well.

It was very noticeable that when the ribs were broken the classical signs usually associated by surgeons with this condition were practically absent. Thus pain on respiration, emphysema, crepitus, and secondary lung trouble were reduced to a minimum, not only in point of frequency of occurrence, but, when occurring, in their slight and transient nature. At first one was much struck by these facts, but their explanation is, I think, simple. When struck by a bullet, the ribs were cleanly perforated, or in some cases pulverised, and there was nothing approaching that severe damage which was so constant a feature of wounds of the long bones; moreover, the penetration of the lung was at the most an insignificant wound with the modern small-bore bullet. In not a few cases, when it was quite evident that a rib or ribs must have been broken, no evidence of this could be obtained by the most careful palpation, nor did the patient limit the depth of his respiratory movements or complain of pain when these were carried to their fullest depth. In one case only do I remember some pain on deep respiration, and in this the pain was of a lancinating character, radiating along the intercostal nerve, which was evidently irritated by a fragment of bone. Such pain as was present was usually only elicited by local pressure.

In no instance did we enlarge the wound (which would have given us complete evidence not only of the fact of fracture, but also of its nature and extent), since such a procedure in the field would, unless imperatively called for by some complication, *e.g.*, intercostal hæmorrhage, have made the patient's condition more serious, and his transit to the base more hazardous.

Emphysema was exceptional, and was never extensive, rarely extending more than a few inches round the wound, and quickly subsiding. In only one case did we see air drawn in and out during the respiratory movements, and in this it was doubtful whether the wound had been made by a bullet or by segment shrapnel.

Case 24. — Lieut. B., Royal Canadians, wounded June 7th, 1900, at Rhenoster River. There was a ragged wound of entry, about the size of a shilling, immediately below the left

clavicle, penetrating the chest through the first interspace; no wound of exit. Air in small quantities was sucked into and expelled from the chest by the respiratory movements, but no chest complications occurred. This patient had also shell wounds of the right thigh and foot, which became septic. He died suddenly eight days after the action.

Hæmoptysis was invariably slight, and never required treatment: it almost always disappeared in a couple of days, and sometimes the patient only spat blood once or twice immediately after the injury; nor is this surprising when one reflects on the very slight wound which such bullets would inflict on an elastic structure like the lung. It was matter of common experience that the mere injury to the lung was hardly ever a matter of consequence.

Hæmothorax was, however, by no means uncommon, and in view of the slight and transient nature of the hæmoptysis and the absence of lung symptoms, it was clear that the bleeding was of parietal origin. In no case did we see sufficient reason to draw off the blood, as it was obviously wiser to get the patient to the base as soon as possible, where that most important desideratum, rest, could be obtained. The mere fact of a long journey in a jolting ambulance or buck-wagon would almost certainly have occasioned fresh bleeding. In some of our cases at Reitfontein (where there was no immediate necessity to send our patients down if so doing would increase their risk) we noted a temporary slight rise of temperature in such cases, this rise at first suggesting the supervention of suppuration.

But of *empyema* we only had one instance:—

Case 25.—Corporal B., 20th Company I. Y., was wounded at Nooitgedacht on December 13th, 1900. Wound of entry on the right side in the posterior axillary line, opposite the intercostal space, the ribs being broken. The bullet was removed from beneath the skin close to the mid-dorsal region of the spine. There had not been any hæmoptysis, but there was dulness at the right base, and slight emphysema round the wound of entry. The patient was brought to the field hospital on December 18th, the temperature being 101°; there was some dyspnœa, and the man was very ill, and, as it was evident he had empyema, he was sent into Pretoria, where he was operated on by Dr. Williamson, portions of the broken ribs being removed, and about forty ounces of pus evacuated. He rapidly improved, but by January 16th there was evidence of accumulation of pus which necessitated further interference. Three weeks later he had healed up, and was doing well in every respect.

Pneumonia was certainly rare; one fatal case occurred among our wounded from Nooitgedacht, but it is open to question how far this was due to the actual injury, and how far to the fact that this man was not picked up for four days, during which time he had been practically without food. I incline to the latter view.

Case 26.—Pte. J. B., 2nd Batt. Northumberland Fusiliers, wounded at Nooitgedacht, December 13th, 1900. Picked up December 17th, and brought in next day. There was a wound the size of a shilling in the mid-axillary line, about one inch above the costal margin on the right side, a second in the eleventh space, which had fractured the eleventh rib and opened the pleura, and in which a Mauser mantle was found. At the vertebral border of the right scapula, opposite

the fourth space, was a third wound, and a fourth two inches below the centre of the right clavicle; the track was through the muscles only. The patient stated that he had spat a good deal of blood; on admission his temperature was high, his breathing rapid, he was restless and much distressed, and had the physical signs of right-sided pneumonia; he died on December 25th.

I saw no case of *pneumothorax*.

Bullet Wounds of the Abdomen.

Non-penetrating wounds were often long, subcutaneous, seton tracks, evidenced by a broad, livid, almost boggy line. They pursued an uneventful course so far as I saw, and in no case was there any evidence of intra-abdominal injury dependent on concussion.

Penetrating wounds occurred in all directions, antero-posterior, lateral, or with varying degrees of obliquity. In some cases they also implicated the chest, and in a few the buttocks and upper part of the thigh. In all the cases under our care in which it was evident from the symptoms that the stomach or small intestine had been wounded, death resulted. In other cases the absence of collapse and abdominal symptoms, and the favourable course the case followed, all pointed irresistibly to the fact that the viscera had escaped damage, although from the position of the apertures of entry and exit such escape seemed almost incredible. Yet there is no doubt that the small bowel was not infrequently pushed aside and escaped perforation, although it was damaged short of this; this fact has been amply proved by the investigations of those who had opportunities of conducting post-mortem research.

Transverse wounds were, in my experience, less dangerous than those in an antero-posterior direction, and when such wounds passed between the top of the trochanter and the iliac crest, they were the most favourably placed of all. Many of our oblique wounds also did well, although there was evidence, in some at least, of lesion of the liver.

The causes of death were hæmorrhage and acute peritonitis. In our cases the peritoneal symptoms varied in the rapidity of their appearance and in their gravity. In some the supervention of abdominal distension, pain, and the characteristic symptoms, was very rapid, and the patient quickly succumbed, while in others the onset was more insidious in its appearance and progress, though equally fatal. In two cases of the latter class which we opened, one ante mortem, the other post mortem, it was remarkable what a quantity of plastic lymph was poured out; in neither was there any pus or fluid. One of these was a wound of the rectum, the other of the vermiform appendix, and it seems highly probable that in such cases the general infection of the peritoneum is of a less intense, though

equally dangerous, nature to that which follows damage of the stomach or small intestine, with their more fluid contents.

Case 27. *Wound of the Diaphragm.*—Corpl. B., 4th Derby Militia, wounded June 7th, 1900, at Rhenoster River. He was hit by a Mauser bullet while running; he spun round, fell, and managed to crawl to cover. Entrance wound, one inch above the lower margin of the thoracic wall, in the mid-axillary line on the right side. Exit, one inch and a half to the left of and on a level with the episternal noteh. There was rigidity of the abdominal muscles on the right side, but no abdominal pain, distension, or siekness. Respiration 48; no hæmoptysis. It seemed probable that the diaphragm had been damaged. The respiration gradually eame down to the normal, and the patient was practically well when he was sent to Kroonstad a week later.

Case 28. *Transverse Wound of the Pelvis.*—Pte. J. J., 2nd Batt. Northumberland Fusiliers, was wounded at Nooitgedaeht, December 13th, 1900. A Mauser bullet had entered three and a half inches below the iliac crest, and the same distance behind the anterior superior spine on the right side, and escaped one and a half inches internal to and below the anterior superior spine on the opposite side. The patient's condition was excellent; there was no pain or distension, nor did he manifest any unfavourable symptoms when he was sent to Pretoria on December 18th.

Case 29. *Wound of the Liver and Kidney. Retained bullet. Recovery.*—A Basuto driver, attached to the Army Service Corps, was wounded by a Lee-Metford bullet at Rustfontein, July 23rd, 1900, while standing some twenty yards distant from a bullock which was being slaughtered. The bullet struck the ox in the forehead and passed out of its neck, wounding the native in the right loin. The wound was ragged, circular, and measured three-quarters of an ineh in diameter, and was situated in the anterior axillary line about two inches below the costal margin. There was no pain, collapse, or abdominal distension, nor was the bleeding at all profuse. On examination under chloroform, the right lobe of the liver was found to be damaged, and two loose pieces, each about the size of a walnut, were removed. Embedded in the lobe was the brass belt-hook of the tunic, which the bullet had broken in half and twisted; this was removed. No trace of the bullet could be found. There was little bleeding, and the wound was plugged with gauze. There was some collapse after the operation. The next day he had much improved, but there was slight oozing of dark blood from the wound, which became rather more profuse, doubtless from the jolting of the ambulance waggon. On the march he passed some bloody urine, and urine also escaped from the wound. On July 25th he was sent to Pretoria by train from Bronkhorstspruit, his condition being excellent. I heard some time later that he had made a good recovery.

Case 30. *Wound of the Stomach. Hæmorrhage.*—An Officer of the New Zealand Mounted Rifles was wounded by a Mauser bullet at Zwartkopjes on August 19th, 1900. He was struck while standing. The small circular wound of entry was three inches to the left of the linea alba, and two inches below the costal margin; exit in the eleventh left interspace four inches from the vertebral spines. There had been some smart bleeding, and the patient had vomited some brownish fluid immediately after being struck. He was suffering great pain, and was in a condition of extreme collapse, negativing operation. He died ten hours after being wounded.

Case 31. *Wound of the small Intestine. Hæmorrhage.*—Piet Meyburg, one of Christian de Wet's commando, was wounded at Rhenoster River on June 7th, 1900, by a Lee-Metford bullet. Entry, one inch above the top of the right great trochanter, exit on the same level but one inch anterior on the left side. There was general tenderness and resistance over the

abdomen below the umbilicus; no tenderness in the flanks; no blood *per rectum* and none in the urine. His general condition was one of extreme collapse and negatived operation; it was evident that the small intestine had been wounded, and that there was also hæmorrhage. He died sixteen hours after the injury.

Case 32. *Wound of the Vermiform Appendix. Peritonitis. Death.*—Pte. P., 4th Derby Militia. Wounded at Rhenoster River, June 7th, 1900, by a Mauser bullet. Entry, typical flesh wound just above right anterior superior iliac spine. Exit, also typical, just below the posterior superior spine on the same side. The abdomen was slightly tympanitic and generally tender, and the patient complained of pain. The following day there was improvement, but towards evening he became restless and morphia was administered. On June 9th the abdomen was more swollen, and there was pain in the right iliac fossa. Temperature 100°. Pulse 128, wiry. Inflammation round the cæcum was diagnosed, and operation decided upon. The abdomen was opened as for removal of the appendix, the centre of the incision passing through the bullet hole. On pushing aside a coil of small intestine the cæcum was exposed, posterior to which the vermiform appendix, adherent to the bowel, was found. It had been half divided, near its attached end, by the bullet. The appendix was removed in the usual way. The cæcum was intact, and the inflammation was strictly limited. A gauze drain was then passed down to the stump of the appendix, and the rest of the wound closed. June 10th, restless, vomiting. Pulse and temperature still the same. No pain. Abdominal distension slight. On June 11th the general condition had somewhat improved; the wound was healthy and the pulse slower and stronger, but the next day he relapsed, the vomiting came on again with greater frequency, abdominal distension increased, and he died at 4.30 p.m.

Post-mortem examination showed general peritonitis, with considerable fibrinous effusion and but little fluid.

Case 33. *Wound of the Rectum. Death.*—Pte. S. A. C., 2nd Gloucesters, was shot by the sentry on the night of January 12th, 1901. There was a perforating wound of the calf and also a wound of the lower abdomen. The bullet entered just about the centre of the horizontal ramus of the left pubic bone and escaped below the right posterior superior iliac spine. I saw the man about twelve hours after the injury; he was in considerable pain, but was not collapsed. The abdomen, especially below the umbilicus, was rigid, tender, and generally distended. Blood had been passed *per rectum* in small quantities; urine normal. Wound of the rectum was diagnosed. The man elected for operation, which was accordingly performed, but owing to the dense matting of the pelvic organs and small intestine it was abandoned without the rent being found, as it was thought the man's best chance lay, not in suture after a prolonged operation, but rather in leaving the adhesions in the hope—a very slender one in view of the general peritoneal infection—of localised suppuration. He died twelve hours later.

Diagnosis.—The fact of penetration of the abdomen can only remain doubtful if the bullet has entered at a distance, *e.g.*, *viâ* the chest, groin, or buttock, and has lodged. The fact of damage to the viscera is by no means so easily determined. Abdominal distension with tympanites, intense pain, collapse, and thirst; the situation of the wound, the vomiting of blood, or its passage by the rectum or bladder, have all their diagnostic significance. But in many cases in which from the situation of the wound, injury of some solid organ or of the intestine seemed almost certain, the patient exhibited no symptoms, progressed rapidly towards convalescence, and no sequelæ made their appearance.

In such cases it is illogical to assume from the direction of the wound and the high probability of internal damage, suggested by the direction only, that such has occurred; I do not believe that in such cases damage to important structures was occasioned.

Prognosis.—The prognosis necessarily depends upon the intra-abdominal damage. Damage to the liver was, so far as we saw, comparatively unimportant; nor is this surprising when one considers the small wound and localised track of the modern bullet; in no instance did I see a fatal case of injury to the liver—*quâ* liver.

Our two cases of wound of the stomach both died, but it would appear from the experience of others that bullet wounds of this organ are not so fatal as might be supposed, provided nothing be given by the mouth.

The only case of undoubted damage to the kidney we met with recovered—as did those in which such injury was suspected; here again such a favourable result would be anticipated, provided immediate hæmorrhage from the main renal vessels did not occur.

Wounds of the small intestine died without exception, and of those of the large intestine, two at least died, but I am unable to state what happened to the others after they left us; as they showed no signs of complication it is fair to assume that they recovered.

Treatment.—To those, who, judging by the triumphs of abdominal surgery in civil practice, anticipated similar success in South Africa, the experiences of the campaign must have been a bitter disappointment. The anticipatory optimism generally indulged in by surgeons was born rather of the wish to do than of a careful consideration of the circumstances under which the procedures would have to be carried out. It is clear that if surgery is to be of any use in traumatic lesions of the abdominal viscera, her aid must be immediately given under the best possible surroundings. Of all conceivable unfavourable conditions for abdominal surgery those of the field surely hold the premier place.

Although much can be done to ensure cleanliness, ideal asepticism is impossible. The frequency of dust-storms, the pest of flies, the after conditions of the patients as regards skilled nursing and the most appropriate diet, and the inevitable transport over many miles of execrable road are adverse circumstances of no mean magnitude. In how many cases was abdominal section, under such conditions, even justifiable, and in how many of these was it successful?

It seemed to me that abdominal injuries with perforation were easily grouped into two classes; those which would prove fatal, operated on or not, and those which would recover if they were let alone, although in this latter class doubtless some subsequent procedure might be rendered necessary, *e.g.*, for local suppuration. In

some of our cases the condition of the patient, due probably to wound of the bowel or stomach *plus* hæmorrhage, negatived operation. All these cases were hopeless from the first, and any operation could only have hastened the inevitable end.

For any operation to be successful, no matter how correct it may be in theory or on practically certain local conditions, it must be practised on a patient capable of withstanding the inevitable shock, as yet showing none of the secondary manifestations which such physical condition is likely to entail, and further must be performed under favourable conditions.

In the cases we saw these conditions were not fulfilled. Before the patients could reach the field hospitals hæmorrhage had depleted them, the contents of the damaged intestine or stomach had worked its baneful influence on the peritoneum, and they were rapidly sinking.

In case No. 32 (page 142) the result of the operation would, I think, have been favourable but for one unfortunate circumstance—the man had to be moved a distance of two miles a few hours after the operation, and I cannot help feeling that this rendered a local peritonitis (as it was at the time of operation) diffuse, for he rapidly grew worse after movement, and died.

From all I saw, and learned from the experience of others I feel convinced, however unpleasant and disappointing the conviction may be, that operative measures for bullet wounds of the abdominal viscera must be infinitely rarely successful, and are but rarely justifiable. In civil practice, however, I am of opinion that the results of operation in precisely similar injuries would prove successful in no small proportion of cases.

If there be reason to suppose that the patient is bleeding internally, and if his general condition does not negative operation, such should, of course, be undertaken, but in none of those cases which we saw did it appear wise to interfere; indeed, these patients were practically *moriturus* when we saw them.

When operation was decided against, there were practically three means of affording the patient the best chance—rest, morphia, and diet.

Unfortunately rest in a field hospital is not so easily obtained, for the necessities of the march and military exigencies must come first. As regards the use of morphia, it has only one objection, it certainly favours flatulence; but at the same time its beneficial effects more than counterbalance this objection. In those cases where the patient showed no signs of intra-abdominal mischief and was free from pain, the drug was not given, but in all others it was used freely.

There is no doubt that in injuries of the stomach and small intestine all food by the mouth must be withheld for some days, nutrient enemata and suppositories being substituted, but in wounds of the large intestine small quantities at frequent intervals may be given.

Bullet Wounds of Bones.

Injuries of bones were necessarily very variable in their nature and severity; we met with all kinds—simple guttering caused by a glancing bullet, clean perforations of cancellous and flat bones, and comminution and fissuring of all grades of severity. The degree of damage was influenced by the shape and nature of the bullet, by its rate of velocity and the angle of impact, and also by the nature of the bone. The bones, in consequence of their density and increased resistance, naturally suffered greater damage than the soft structures, and this was especially the case if the bullet was travelling at a high rate of velocity, which entails greater striking power, the full effect of which was gained when it struck the bone at a right angle. Yet in many cases we saw very severe damage inflicted (especially to the lower end of the humerus) by bullets which had lodged, this in itself being good evidence of low velocity. Expanding bullets produced on the bones, as in soft structures, a high degree of injury, causing extensive and severe comminution, and driving fragments into the torn and lacerated muscles, or making them project from the wounds of exit. Of these we saw some good examples at Rustenburg among those who had been ambushed some days before our entry, when the Boers used soft-nosed and Martini bullets.

The position of a bone did not influence the nature of the injury it sustained so much as it influenced the concomitant damage to the soft structures. Thus, in cases where the shaft of the femur, deeply seated among the muscles of the thigh, was damaged and much comminuted, the exit wound was often insignificant, but in the case of the more superficially seated bones of the forearm, the overlying muscles and skin were severely torn and bruised.

As regards the bone itself the point of greatest importance was its density, compact bone suffering comminution and fissuring, while cancellous tissue was cleanly drilled, and in such cases the exit wound was not appreciably more severe than in simple flesh wounds. Of clean perforations of cancellous bone we saw a good number of cases.

Case 34.—Trooper G. R., 16th Co. I. Y., was shot on June 11th at Rhenoster River. The flesh wounds were quite typical, and the bullet had cleanly penetrated the tibia four inches below the apex of the patella. The wounds quickly scabbed, and when this man was sent to Kroonstad, on June 14th, they had practically healed.

We also had one case (Drummer W. N., 2nd M.I.) of clean perforation of the lower end of the tibia one inch above the articular surface. Of perforations of the tarsus, we saw some dozen instances. Clean perforation of the skull and scapula were common, and we saw one case of perforating wound of the clavicle.

Case 35.—Pte. W., 4th Derby Militia, June 7th, 1900. A Mauser bullet entered half an

inch above the centre of the spine of the right scapula, passed through the chest and emerged in front, after perforating the sternal end of the right clavicle. There was tingling pain down the arm and affecting all the fingers but the thumb; no paralysis and no chest symptoms.

The ribs also were usually cleanly drilled or notched, and I cannot remember any case, nor have I notes of such, in which we saw fractured ribs presenting the clinical characters met with in civil practice. (See Wounds of the Chest, p. 137).

The ilium was usually cleanly perforated, and we saw cases in which a bullet transversing the pelvis from side to side had drilled a clean hole right across. If the ilium was struck at a tangent there was comminution, the bone being pounded up. In cases of clean perforation the signs of fracture were of course absent, and the cases so far as we saw ran that favourable rapid and aseptic course which was characteristic of simple flesh wounds. The chief points observable in fractures of the long bones were extensive comminution and fissuring. In default of the X-rays we could not of course, in most cases, accurately determine the exact physical condition; but many examinations with the finger gave a very accurate picture of the damage. It was noticeable that in the case of the shaft of the femur the fragments were often of large size, in which case they were not as a rule displaced; at the lower end of the humerus the bone was more shattered. Sometimes the bone was literally pounded, and on examining the seat of fracture with the finger, numerous minute fragments could be felt in all directions driven into the muscles and soft structure like so many fragments of glass. It was not the least remarkable surgical experience of the war that the limb itself showed but little evidence of the damage which its mainstay had sustained. In point of fact that deformity which, in civil practice, is such important and constant evidence of fracture, was reduced to a minimum, and I was often surprised to find to what extent the bone had suffered—an extent which would hardly be credited by a surgeon who saw such a case for the first time. Shortening was rarely marked nor was the position of the limb, so characteristic of certain fractures, in marked evidence. In point of fact the muscles were temporarily paralysed from local shock and hence the classical signs were for the most part absent.

Complications of Fracture.—The complications of fractures of the ribs, spine, ilium, and skull can, with few exceptions, hardly be classed as instances of complicated fracture, since the fact of fracture had nothing to do with such complication, the concomitant damage being solely due to the onward passage of the bullet.

Complications dependent upon the fact of fracture were, in our experience, decidedly rare. The musculo-spiral and ulnar nerves were occasionally damaged. (See Wounds of Nerves, p. 150.) Since my return from Africa I have seen cases in which the musculo-spiral nerve has been caught up in callus and scar-tissue following fracture. It must be remembered that in the field it is extremely diffi-

cult, often impossible, to definitely determine the fact of actual division or partial division of nerve fibres, even immediate paralysis being by no means conclusive evidence on this point.

Fracture by a bullet wound was never complicated by dislocation, nor did we see any case of injury to a main artery.

In some cases of fracture of the femur extensive fissures implicated the knee joint, as evidenced by slight synovitis and fluid effusion. Direct damage to the articular ends of bones will be more properly considered under wounds of joints.

Progress of Fracture Cases.—Simple perforation of cancellous bones healed kindly without suppuration, but compound comminuted fractures of the long bones too frequently suppurated. Although I saw many of these cases in the base hospitals, yet I had but few opportunities of seeing the progress of our own cases (which were quickly sent to the base) except at Reitfontein after the action of December 13th. In bad cases, suppuration was the rule, and small fragments of bone continually worked out of the wounds. In only a few cases did I see the inflammatory process assume severe proportions, and in two of these amputation became neeessary (Yeomanry Hospital, Pretoria). In consequenee of the presence of small pieces of bone, which were often driven among the tissues and could not be detected, but which excited suppuration until they were extruded, and of the bruising and damage to the soft parts, repair was much delayed, and was effected by a large amount of soft callus.

Case 36.—Pte. B., Protectorate Regiment, wounded at Rustenburg some days before our arrival. When we took him away with us on our return to Commando Nek, we found the following:—There was a wound about the size of a shilling in the centre of the left arm, about an inch and a quarter above the bend of the elbow, the arm was much swollen, very painful, and an abscess had formed round the seat of fracture. Examined under an anæsthetic, the humerus was found to be broken into numerous fragments (which being loose were removed) and the bullet (a deformed Mauser) was lying at the bottom of the abscess cavity. Free drainage was employed, and the limb was put up on an inside angular splint. Improvement was rapid, and three days later, when we sent him to Pretoria, the discharge was much less, the pain and swelling had disappeared, and the limb was doing well.

Case 37.—Lance-Corpl. A. M., 2nd Mounted Infantry, was wounded at Nooitgedacht, December 13th, 1900. Entrance wound on the inner side of right thigh on a level with the scrotum; exit on the outer side of the middle of the thigh and about the size of a shilling. The suppurating wound was enlarged, and several fragments of loose bone were removed; there was a gap of half an inch between the fragments. This patient remained with us until we evacuated the hospital on January 21st, 1901. During this time other fragments necrosed and were removed; the temperature oscillated from normal to 102°, and the discharge continued. On his removal to the Yeomanry Hospital, Pretoria, he came under the care of Dr. Williamson to whom I am indebted for the following particulars. Further fragments of bone were removed under chloroform, and a counter-opening was made at the back of the thigh. Irrigation was continued twice daily for a month, and the temperature fell to normal. On Feb. 26th further necrosis was suspected; an anæsthetic was

given and more fragments removed. From this time the discharge gradually ceased and the wound healed. The union was not firm although the patient could stand; there was shortening to the extent of an inch and a half.

Treatment of Fractures in the Field.—The immediate treatment of compound fractures in the field is one of the most important matters which can occupy the attention of the surgeon. Much depends on the initial treatment, for not only does the future of the limb but often the patient's life depend upon its efficacy. There is no case more to be pitied than that of a patient with a bad compound fracture who has to be transported from the front to a stationary hospital, perhaps for many miles, in an ambulance or on a buck-wagon, over a bad road at the mercy of a native driver who cannot be made to realise that every jolt causes his passenger intense suffering, and may occasion irreparable injury. When transporting patients with bad fractures, it was our practice to off-load the wagons at drifts and over bad ground and have the wounded carried on stretchers; no doubt this takes time, but the suffering it saves and the additional injury it averts are well worth the time and trouble when the exigencies of the march permit. There is no form of apparatus, no build of wagon, which can altogether do away with the pain and possible injury of transport. Fortunately morphia is the means of saving much pain, but the damage which is occasioned by the movement of the shattered limb too frequently excites considerable inflammation, which may not only retard union but cause still more serious trouble. It is these considerations as regards the transport of badly comminuted fractures which sometimes turn the scale against the limb when the advisability of an attempt to save it or of performing primary amputation has to be considered, and hence it arises that amputation is sometimes performed in the field when it would not be entertained in a stationary hospital (see p. 119).

After the action at Nooitgedacht, we had many opportunities of seeing the ill effects of transport among patients under our own care and others under Captain Probyn's. Many of these cases had already been transported on buck-wagons for over twenty miles, and had suffered in consequence. It was so evident that to some, at least, a further journey into Pretoria would probably lead to consequences which would entail the loss of the limb, that we kept the patients with us until such time as all inflammatory symptoms had subsided, and the wound was doing well.

In nearly all cases of fracture, we examined our patients under an anæsthetic. If the case was one in which the wounds in the soft parts were quite small, and the bullet had escaped, the parts were thoroughly cleansed, and after the application of a dry dressing, the limb was put up with the best form of splint at our command. In the majority of cases the wound of exit, and not infrequently that of entry, was of considerable size, and in such the seat of fracture was explored by the finger, and hence its precise nature could be more accurately ascertained and loose fragments

removed. Similarly in cases of fracture, with lodgment of the bullet, digital exploration was practised, and when neeessary the wound of entry was enlarged for this purpose. When the discharge came through, we invariably dressed these cases as soon as opportunity offered, and it is worthy of note that the discharge was often copious, doubtless in consequence of the irritation excited by the unavoidable movement during the day's march. We always endeavoured to send our fracture cases off as soon as possible, so that they might be placed in a position of absolute rest without unnecessary delay.

The application and choice of splints in the field affords scope for considerable ingenuity, especially if the patients have to be carried in the ambulance for some days. For the upper limb, we found nothing answer so well as the inside angular, and when the patients were able so to do, we let them walk rather than ride, as thereby greater rest to the limb was ensured. The putting up of fractures of the lower extremity so that the patient could be transported with the minimum of discomfort, was a most difficult problem, the difficulty increasing the higher up the limb was broken. A long back splint with a footpiece and two lateral splints answered better than any other form of apparatus, and in some cases we found it advantageous to improvise a sling by means of straps or sheeting between the side of the ambulance and the centre-board, so that the knee and thigh being flexed, and the leg slung, the jolting was avoided as much as possible.

In cases of fractured thigh, a long splint on the outer side and a strip of pine boarding, in front, behind, and internally, or the inclusion of the whole thigh in Gooch's splinting were the best plans of steadying the limb, but it must be confessed that the best left much to be desired.

In only one case was an operation performed for wiring fragments (see Case 44, page 152). In the great majority, the comminution was so extensive that such a procedure was negatived, even had other circumstances been favourable for the operation.

Bullet Wounds of Joints.

We saw very few cases of direct bullet wounds of joints, but extension of linear fractures into the knee were not uncommon. Such cases as we did see were usually of the simplest nature, and in none did the question of operative interference even present itself, nor did I see any case in which inflammation of a severe form occurred, although it may be that such occurred in some of the cases after they had been transferred to the base. Mr. Makins describes a condition which he calls vibration synovitis which occurred independently of any direct primary injury to the joint, and was due to concussion of the limb. This condition was characterised by slight effusion and consequent swelling. Of such a condition we saw several in-

stances, especially in the knee and ankle, but in many of these it is impossible, in the absence of skiagrams, to be certain that the condition was not due to extension of a fissure. The following case, however, seems to be typical:—

Case 38.—A Private was wounded by a Mauser bullet while escaping from a Boer laager. The bullet entered on the dorsal aspect of the forearm about an inch and a half above the lower end of the ulna, and taking a subcutaneous path emerged over the base of the first metacarpal bone. There was no evidence of fracture, but there was considerable effusion into the wrist joint with limitation of movement which was painful.

In all our cases of joint injury the bullet had escaped, and the wounds were quite small and unimportant, and, except at the elbow joint, we never saw much damage inflicted on the bone ends; it was noticeable that in the case of the knee and shoulder the damage was little greater than that sustained in wounds of the soft tissues only. In the following case it is probable that the bullet passed through the joint without touching the bones:—

Case 39.—Gunner S.W., 'J' Battery, R.H.A., was wounded by a Mauser bullet on December 19th, 1900. The bullet entered just to the left of the patella about its middle, and escaped in the middle of the popliteal space. The joint was slightly distended with fluid; there was no pain on movement, which was however limited (voluntarily), nor was there any evidence of damage to the bones, nerves, or vessels. When this patient was transferred to the base, eight days later, the joint was practically sound and all effusion had disappeared.

The treatment we adopted in all these cases was the application of an antiseptic dressing and fixation by such means as the special joint required.

Bullet Wounds of Nerves.

Injuries to nerves were not uncommon, but I only saw one case in which it was clear that a nerve had been completely divided. In this case it was uncertain whether the injury had been caused by the bullet or by the fragments of bone.

Case 40.—The patient was an officer who had been hit just above the right wrist by an expanding bullet—he thought a Martini—the ulna was extensively comminuted and the ulnar nerve severed: the case was taken by us from Rustenburg some week or ten days after the injury: the wound was septic and there was considerable pain dependent upon septic neuritis.

In our cases, owing to their short stay with the field hospital, we could never be sure as to the precise injury which a nerve had sustained, as this can only be determined by careful observation for some time. In most cases at least, it seemed highly probable that the nerve had been simply contused without any actual loss of continuity of its fibres, although in some cases, doubtless, these had been crushed, and their conducting power abolished.

Case 41.—Pte. L. O., 4th Derby Militia, wounded June 7th, 1900, at Rhenoster River. Entrance wound two inches above the tip of the inner condyle of the humerus, exit two inches

higher up, close to the inner margin of the biceps. There was paræsthesia over the area supplied by the ulnar nerve and partial muscular paralysis. Slight inflammation of the wounds with a little surrounding cellulitis set in, but quickly subsided. When he was sent down a week later, the signs of damage to the nerve were neither better or worse.

In another case there was similar evidence of bruising of the great sciatic, but in this patient the symptoms were considerably less marked when we sent him down.

In the following case it is highly probable that the bullet cleanly punctured part of the brachial plexus:—

Case 42.—On June 7th, at Rhenoster River, Col. W. was hit by a Mauser bullet which entered the neck, two fingers breadth above the left sterno-clavicular articulation, and escaped the same distance above the triangular smooth surface on the vertebral end of the spine of the scapula. He suffered considerable pain, especially when the arm w s moved. Extension movements at the elbow and of the wrist and fingers were very feeble, although not quite abolished; there was impairment, but not abolition, of sensation on the dorsal aspect of the hand and over the three inner fingers, but over the thumb and index finger and adjacent part of the hand, sensation was perfect. The ulnar muscles were not affected. There was no improvement during the week this officer was with us—the wounds healed without trouble. I have seen this gentleman since my return, and am glad to record that his arm is now practically quite well, although there is still some slight weakness.

We did not observe that injury to a nerve was associated with much pain. Complete and immediate paralysis does not necessarily indicate section of a nerve, as I had opportunities of seeing. One such case which I have been able to follow to complete recovery is very interesting.

Case 43.—The patient—a Yeoman—sustained a comminuted fracture of the lower third of the right humerus—there was at once complete musculo-spiral paralysis and anæsthesia. The fracture healed after suppuration and exfoliation of necrosed fragments, but the wrist-drop did not improve. The muscles wasted and characteristic trophic skin changes made their appearance. Suspecting that the nerve was caught up in callus, I cut down on it and found it embedded for some two inches of its length in dense scar-tissue. Improvement was immediate, and recovery eventually complete.

This case is of interest as showing the length of time during which contusion may affect the conducting power of a nerve, so long in this case that the compressing influence of the dense scar-tissue was felt before recovery from contusion had begun to manifest itself.

In two cases of bullet wound of the neck the patients became hoarse and partially aphonic, pointing to bruising of the recurrent laryngeal nerve. In both these the bullet had passed across the right side of the neck, entering first above the sterno-clavicular joint and emerging above the spine of the scapula. In neither was there any damage to the vessels, and in both the wounds did well.

As regards the treatment of nerve lesions in the field, there is nothing to be said. No surgeon would, of course, cut down on a nerve even with the strongest

evidence of its complete division. Such cases would always be sent down to the base hospital for observation and such treatment as this would indicate.

Bullet Wounds of Blood Vessels.

It is impossible to form an opinion of any value as to the frequency with which large vessels were divided or damaged by bullets, for it is obvious that such wounds must, in the great majority of cases, be immediately fatal, and on the field the surgeons' and orderlies' duties lie in the direction of succouring the living rather than in carrying out inquiries as to the nature of the injuries to the dead. The fact of death is sufficient, its cause matters little, and under the attendant circumstances, a minute inquiry in such a direction would commend itself to few, and, even if it could be carried out, would be barren of practical results. There is little doubt that many, perhaps the vast majority, of cases of death from wounds of the abdomen and chest, were due to internal hæmorrhage. But although doubtless many men died of hæmorrhage, yet we saw many very remarkable instances of bullets practically crossing the line of important vessels without impairing their integrity, at least immediately, although doubtless many such cases did, and some I know did, eventually develop various forms of aneurysm — sacculated, traumatic, or varicose.

In the majority of cases of simple flesh wounds there was, as I have already stated, but very slight bleeding, nor would one expect otherwise when it is remembered what a very small wound the bullets made. The application of a ligature, except in cases of large and lacerated wounds, was a rare necessity, of a tourniquet still less common.

The only case of really severe and dangerous hæmorrhage which I can call to mind was that of a man we picked up at Kopjes Station on June 14th, 1900.

Case 44.—A Private in the Shropshire Light Infantry had been shot through the right side of the neck, and the bullet had passed upwards, shattering the symphysis of the jaw. He had bled very copiously, as was evidenced by the pools and clots of blood on the floor of the station building in which he lay, and which he had been trying to defend. So bad was he that Dr. Green and I felt sure he would die before we could get him into camp. Curiously enough the journey pulled him together in a most remarkable manner, attributable in a large measure to his regaining his mental balance, which had been severely unhinged. He was at once placed under chloroform and the jaw wired. The bleeding was found to have proceeded from the floor of the mouth and the superficial veins of the neck.

Bruising and Partial Rupture of Arteries.—Several cases came under our notice in which a large artery had been contused by a bullet, apparently with rupture of the internal coat. In such there was no swelling or pain, but the nature of the injury was inferred from the presence of a distinct thrill and

diminution of the pulse below. The following is a typical instance of the condition :—

Case 45.—Gunner J. H., 'P' Battery, R.H.A., was wounded by a Mauser bullet on December 13th, 1900. The bullet had passed through the left arm at the junction of the upper and middle thirds, passing just external to the line of the brachial artery. There was a soft thrill over the artery, and the radial pulse was much smaller than on the other side, but there was no swelling or bruising in the track of the bullet.

In some of these cases no doubt thrombosis ensued, and the artery became obliterated at the point of damage; in others, aneurysm followed sooner or later, as in the following :—

Case 46.—Pte. J. S., 4th Derby Militia, wounded at Rhenoster River on June 7th, 1900. Entry, close to the margin of the anus on the right side; exit, two and a half inches above and external to the posterior superior iliac spine on the right side. There was no evidence of damage to the bone, the vessels, or the nerves. The wounds healed well, and the patient was sent to Kroonstad a week later. While there it was noticed that the right foot had a tendency to droop and turn in; very soon a painful swelling appeared on the dorsum ilii, which ultimately measured five inches in diameter, and proved to be aneurysmal. The patient was operated on in the base hospital at Wynburg. Mr. Evans saw him on passage home, December 17th, 1900, when he found the limb much wasted, the foot drooped and inverted, and the knee-jerk absent. There was anæsthesia round the ankle, over the dorsum of the foot and toes, on the outer side of the foot, and on the inner side of the great toe. Perception of heat and cold was present but delayed. Trophic changes in the skin were advancing, but were partly masked by extensive scarring from an old scald. It would appear probable that the sciatic nerve had become involved in scar tissue.

A very interesting example of aneurysm appearing some weeks after bruising of an artery came under my notice at the Yeomanry Hospital in Pretoria when I had temporary charge of the surgical cases.

Case 47.—The bullet had passed through the right great pectoral muscle in the line of the axillary artery and had lodged, but its position could not be ascertained. Over the artery there was a purring thrill, but no swelling; the radial pulse was very small. I saw this case many times, and there was no alteration in the condition, but I heard afterwards that he had developed a large axillary aneurysm, which was successfully operated on by Dr. Williamson.

Traumatic Aneurysm.—The small size of the apertures of entry and exit and the narrow track of the bullet were points of no little benefit to patients when a large vessel had been damaged, for these conditions undoubtedly saved some who would otherwise have died of hæmorrhage. The following case is typical, and illustrates how, even with a considerable wound of a main artery, the bleeding may be slight, and how the appearance of definite signs of arterial hæmatoma may be delayed for some time, such delay being due to the presence of a thrombus in the vessel, which, however, is unable to withstand the force of the blood current when the patient begins to get about.

Case 48.—A man about twenty-two years of age, waking up in the night and feeling some

hard substance beneath his thigh, put his hand down to remove what proved to be his revolver. Half sleeping, he caught hold of it, and without realising what he was doing, pulled the trigger, the bullet passing through his thigh just internal to the femur in the middle. He bled a little, but not excessively, and the wound was dressed in the usual way. In about four days he felt so well that he began walking about, but at the end of a week a swelling appeared and caused some pain, so he was sent into Barberton to the civil hospital. Aneurysm was diagnosed, and as it was rapidly increasing, and some hæmorrhage had taken place, a tourniquet was placed in position, and an orderly told off to attend to it. About ten days after the accident I was invited to see the case by Colonel Donovan, P.M.O., Barberton force, and Civil Surgeon Hancock, in charge of the civil hospital, and, advising immediate operation, was courteously asked to perform it. On cutting down, I turned out about a small handful of clot, and found the femoral artery half divided, the wound gaping as if a piece had been taken out of the vessel with a cigar-cutter. The artery was completely divided, and tied above and below. The patient made a good recovery. The small size of the aneurysm and its localisation seemed to those who were present to be due to the extreme density of the aponeurotic structures of Hunter's canal.

A somewhat similar case came under our care at Commando Nek, but in this I decided to ligature the femoral at the apex of Scarpa's triangle, as I did not wish to tie at the wounded point in consequence of the septic condition of the wound. This patient also did well from the first. This case differs from the preceding in the fact that the aneurysm clinically resembled the ordinary sacculated variety, but that it was not such was proved by the escape of blood and clot from the wound in the thigh, unless one is prepared to admit that a sacculated aneurysm had formed and burst.

Arterio-venous Aneurysm.—Although cases of varicose aneurysm have been very common in South Africa, the conditions of our work in the field precluded us from seeing such cases in our own practice, although I saw several such in the base hospitals. The only case under my care was, however, one of considerable interest.

Case 49.—Pte. C. D., 2nd Northumberland Fusiliers, was wounded at Nooitgedacht on December 13th, 1900. Entrance in the middle of the thigh anteriorly; exit directly posterior; track apparently between the femur and the vessels. Opposite the wound the femoral pulse was somewhat heaving, and there was a distinct systolic thrill, but no swelling; the pulse below could not be felt, but the circulation was good. This man was kept at Reitfontein for a fortnight, during which time there was no change observable, and the wounds healed. He was then sent to the Yeomanry Hospital, Pretoria, where I again saw him some weeks later, and found a distinct tumour about the size of a pigeon's egg with the characteristic thrill of arterio-venous aneurysm. I cut down on the tumour on January 7th, and found that there were two femoral veins, with one of which the artery communicated. The tumour was due to yielding of the wall of the vein. As it was impossible to separate the structures, I placed a ligature above and below, and excised the mass. The patient made an interrupted recovery.

In this case I think that the bullet passing between the artery and affected vein damaged both, and the walls coalescing as healing took place, the septum gradually yielded under the blood pressure and ultimately gave way, the thin walled vein then dilating.

Only one case of *sacculated aneurysm* came under my notice.

Case 50.—*Sacculated Aneurysm.*—This man had been wounded through the ham some three

months before I saw him when he was complaining of pain in the popliteal space which prevented his marching. On examination I found a typical popliteal aneurysm about the size of a bantam's egg, but no persuasion on my part could induce him to be operated on before his arrival in England, whither he was subsequently invalided. The arterial system was apparently sound except for this aneurysm, and it seemed highly probable that the bullet had bruised the artery and damaged the outer coat so that the walls gradually yielded under the normal blood pressure, such yielding being strongly favoured by arduous marches.

Shell Wounds.

Of shell wounds we had only thirty cases. This when compared with our cases of bullet wounds emphasises the fact that artillery fire produces less physical than moral damage. The demoralising effect of a heavy pom-pom fire must be experienced to be appreciated.

The campaign has added but little, if anything, to the knowledge we already possessed on the subject of shell wounds.

The irregular nature of the missile, its weight, and its low velocity combine to make the wounds inflicted by it contused and lacerated. Among our cases we met with all grades of severity from grazing with extensive subcutaneous ecchymosis and bruising to complete pulping of the part struck. On the field many of the dead had received the most ghastly wounds from shells—one case is worthy of note. At Zwartkopjes Major Hale found a pool of blood close to which was a large portion of the vertex of a skull; some twenty yards distant was the body—it would appear that after this man had been struck he mechanically continued his course for this distance.

At Roodewal we had some very severe wounds inflicted by portions of the case of Boer shrapnel shell. The damage to the soft parts was very great, and the bones were completely smashed. In all these cases the degree of shock was extreme.

Case 51.—Pte. M., Railway Pioneer Regiment, wounded at Roodewal, June 7th, 1900. There was a large lacerated wound at the outer part of the right arm in the deltoid region; part of the skin and muscle had been completely destroyed, and the upper end of the humerus was shattered. The comminution was very extensive, fourteen pieces of bone, varying in length from half an inch to three inches being found. Embedded in the middle of these was piece of the case of a segment shrapnel shell measuring two-and-a-half by one-and-a-half inches. The degree of shock was very marked. The limb was removed at the shoulder joint, but the patient gradually sank and died on the 10th.

Wounds by shrapnel bullets were usually contused and painful; they were lacerated, and not infrequently the bullet lodged.

After Nooitgedacht, where the fighting was on very rocky ground, we had four cases in which parts of the body had been peppered by small fragments of shrapnel bullets and minute pieces of stone; all these wounds were quite superficial, and in many instances small pieces of lead and stone were embedded just beneath the skin.

The Boer segment-shrapnel made a wound similar to that inflicted by a fragment of pom-pom. The following is a typical case:—

Case 52.—Pte. W., Shropshire Light Infantry, was wounded at Roodewal, June 7th, 1900. There was a rounded, lacerated, and contused wound about the size of a two-shilling-piece over the angle of the lower jaw on the left side. At the bottom of the wound a piece of segment-shrapnel was found, and on its removal a considerable quantity of woollen material was found beneath it. The man was wearing a Balaclava cap when struck. The ramus of the jaw was splintered, and one piece of bone was removed. The cavity of the mouth was not opened. This wound suppurated, and a considerably slough of the deeper tissues came away, but when the man was sent to Kroonstad a week later he was well on the way to recovery.

In some cases when a portion of shell had struck obliquely the damage inflicted was of the nature of a contusion, the superficial wound being a mere graze.

Case 53.—Pte. D., 4th Derby Militia, Roodewal, June 7th, 1900. A piece of segment shrapnel was found embedded in the sole of the boot close to the instep. There was no wound, but the patient complained of considerable pain over the external lateral ligament, and the ankle joint contained fluid. There was pseudo-paralysis of the leg for three days. No fracture could be made out.

In all cases wounds by portions of shell, or by segment-shrapnel, and most of those caused by ordinary shrapnel bullet suppurated; in a few there was limited cellulitis (this was especially the case when the foot was damaged), but in none did we meet with wide-spread or serious inflammation.

Analysis of Cases of Wounds primarily taken by the Field Hospital and Bearer Company.

(This does not include any cases we saw or treated which did not come under our care from the first.)

Wounds of the Head (10)—	
Scalp wounds	4
Compound fracture without depression	2
Compound fracture with depression ...	2
Penetrating fractures with lodgment of bullet	2
Wounds of the Face (12)—	
Simple flesh wounds	7
Compound fracture of the lower jaw...	2
Compound fracture of the upper jaw...	1
Injury to the globe	2
Wounds of the Neck (13)—	
Simple flesh wounds	6
With injury of the brachial plexus ...	2
„ „ recurrent laryngeal nerve	2
With injury of the trachea	2
Compound fracture of the clavicle ...	1
Wounds of the Back and Spine (9)—	
Simple flesh wounds	6
Fracture of the spine	1
„ „ with lesion of the cord	2
Wounds of the Chest (36)—	
Simple flesh wounds	14
Flesh wounds with fractured ribs ...	7
Perforation with lesion of the lung ...	12
Penetration with lung lesion and lodgment of bullet	3
Wounds of the Abdomen and Pelvis (26)—	
Simple flesh wounds	4

Perforating wounds without obvious intra-abdominal lesion		3
Perforating wounds with lesion of the intestine		2
,, ,, rectum		2
,, ,, vermiform appendix		1
,, ,, stomach		1
,, ,, liver		4
,, ,, kidney		1
,, ,, diaphragm ...		1
,, ,, bladder		2
Compound fracture of the pelvis with lodgment of the bullet		3
Compound fracture of the pelvis without lodgment of the bullet		2
Wounds of the Upper Limb (85)—		
Simple flesh wounds		61
Compound comminuted fractures ...		24
Of the clavicle	2	
,, scapula	2	
,, humerus	6	
,, radius	1	
,, ulna	4	
,, radius and ulna ...	1	
,, carpus and metacarpus	4	
Of the phalanges	4	
Wounds of the Lower Limb (126)—		
Simple flesh wounds		96
Compound comminuted fractures ...		30
Of the femur	7	
,, tibia	7	
,, fibula	2	
,, tibia and fibula ...	4	
,, tarsus	5	
,, metatarsus	5	
Wounds of Large Vessels (8)—		
Bruising		6
Traumatic aneurysm		2
Wounds of Large Nerves (7)—		
Of the brachial plexus		2
,, sacral plexus		1
,, ulnar nerve		3
,, musculo-spiral nerve ...		1
Wounds of Large Joints (10)—		
Of the shoulder		2
,, elbow		2
,, knee		5
,, ankle		1
Total number of wounded ...		342

In 27 cases the bullets lodged. In 40 cases the patient had multiple wounds, but in the above tables only one wound (the most serious) has been counted.

PART II.

Accidental Injuries.

The following is a summary of accidents which were treated by us in the field :—

Injuries to the head		3
,, ,, chest		2
,, ,, back		4
,, ,, abdomen		4
,, ,, joints		25
Traumatic arthritis	1	
,, synovitis	7	
Dislocation of humerus ...	3	
Sprained knee	2	
,, ankle	10	
,, wrist	2	
Fractures—		
Clavicle		5
Forearm		1
Wrist		1
Leg		4
Jaw		1
Burns		5
Sunstroke		6
Contusions, bruises, galls		22
Unclassed injuries		32
Total Accidental Injuries		115

The cases included in the above table need but few remarks, being such as are met with in every day civil practice, without presenting any special features. Nearly all these cases of injury were consequent on horse accidents, and none were severe. Considering the roughness of the ground, the numerous stones and holes, it is noticeable that horse accidents were infrequent, for it is to be noted that for many months the Field Hospital and Bearer Company was attached to a Cavalry Brigade.

Our cases of *sunstroke* were all mild ones. The patients were considerably exhausted, the pulse slow and feeble, and there was muscular weakness, with intense headache and nervous prostration. In some cases there was slight fever, and no doubt some of our patients who were sent to the base suffering from a mild degree of fever and debility were really suffering from the effects of insolation.

Of our two cases of *lightning stroke*, one was immediately fatal, the only sign of injury being a small wound on the forehead. The second case was that of a native, who did not come under our care until the second day after the injury. There was a superficial burn running across the chest from the centre of the right clavicle downwards and to the left, where it terminated in three lines like a trident. It was about a quarter of an inch broad, was perfectly healthy, and not surrounded by inflammation. The hair had been burnt away in this line. The man was feeble in the extreme, and seemed as if all the life had been knocked out of him; indeed, it was as much as he could do to stand. The muscles were tremulous, and the pulse small and feeble. He was sent to Middelburg from Godwaan River, and was improving at the time he left us.

Our *burn* cases were due to the explosion of loose gunpowder, and presented no peculiarities. One man was severely burnt about the face, and for some days the swelling was extreme, so that he could not see. Soon after our arrival at Barberton he was practically well.

PART III.

Surgical Diseases.

The following tables show the number of cases of surgical disease met with in the field:—

Diseases of the Eye (13)—		Varicocele	3
Conjunctivitis	10	Hæmorrhoids	11
Iritis	1	Diseases of the Skin and Cellular Tissue (77)—	
Corneitis	1	Cellulitis	6
Error of refraction	1	Carbuncle	1
Diseases of the Circulatory System (15)—		Abscess	44
Varicose veins	1	Ulcer	5

*Veldt sores	21
Diseases of the Glandular System (8)—	
Lymphadenitis	8
Diseases of the Intestinal Tract and Liver (11)—	
Fissure in ano	2
Fistula in ano	2
Hernia	4
Appendicitis	2
Hepatic abscess	1
Diseases of the Genito-urinary System (17)—	
Hæmaturia	4
Cystitis...	1
Stricture	4
Hydrocele	1
Orchitis and Epididymitis	7
Tumours	4
Total Surgical Diseases	145

Only a few of the above conditions need remark. The cases of *conjunctivitis* were all due to dust, and considering how frequent and dense the dust-storms were, it is surprising that the eyes did not suffer more; in no case did we have to remove a foreign body.

The most noticeable disease in connection with the circulatory system was *hæmorrhoids*, for although we only sent eleven cases to the base for this condition yet many patients included in our casualty list were treated for slight degrees of the affection. The frequency of piles was in great measure due to chronic irregularity of the bowels, from which so many men suffered, persistently returning or chronic diarrhœa led to a relaxed condition of the mucous membrane with slight prolapse, and the accompanying congestion of the hæmorrhoidal veins soon led to varicosity. In other cases the monotonous diet of trek-ox, bully-beef and biscuit, with but little fresh vegetables, and such only on rare occasions, induced chronic and obstinate constipation, and consequent hæmorrhoids. During the rains, no doubt the constant exposure to wet, the difficulty of drying the clothes, and long hours in a wet saddle had an injurious influence, and when piles were actually present they were thus much aggravated.

Subcutaneous *abscesses* were common, and in some cases complicated veldt sores, but in the majority a slight scratch or the bite of an insect seemed responsible for the suppuration. These abscesses were always quite small, and healed rapidly.

Veldt Sores.

It was on column especially that one had innumerable opportunities of seeing and treating veldt sores; it was only the very worst cases which were sent to the base. These sores are the indigenous production of the veldt, and although during the campaign there were doubtless contributory causes, such were contributory only. Chief amongst these must, I think, be mentioned the absence of fresh vegetables and fruit. It was most striking how the numerous cases of such sores which we

* Only very bad cases of veldt sores were admitted to the hospital. Very numerous others were treated day by day, and are included in our casualty list.

constantly saw rapidly improved under the influence of the oranges and fresh fruit which the men obtained in such plentiful supplies in the Rustenburg Valley, but it must not be supposed that veldt sores are in any sense of scorbutic origin. That these sores are due to local infection there can be no doubt. In many cases they closely resemble cases of streptococcus infection, with which all surgeons are familiar; moreover, they healed soundly and rapidly under antiseptic measures. The exposed parts of the body were chiefly affected, the dorsal surface of the hands and of the fingers being the favoured sites; on the neck and at the margin of the hairy scalp they were not uncommon, but were rarely severe. A few occurred on the face. Of the covered parts of the skin, the anterior surface of the leg below the knee was usually affected—the trunk very seldom—and it was noticeable that some of the worst cases we saw were on the legs, doubtless due to the additional irritation consequent on constant marching.

Veldt sores with a special predilection for extensor surfaces were especially likely to develop at the seat of a scratch or abrasion, but in many cases no such obvious point of infection could be found. The rapidity with which a veldt sore formed and spread was very noticeable. When there was no scratch the commencement of the sore appeared as a small discoloured area, looking, in many instances, not unlike the bite of an insect; very soon the epidermis was raised up by a little bloody serum, and the patch rapidly increased in size, so that in a few hours it might cover an area as large as half a crown. Suppuration ensued, and when the detached epidermis was removed the raw surface of the skin was exposed, and in the centre of this the superficial layers were being destroyed. Sometimes these sores extended to the subcutaneous cellular tissue, but never beyond the deep fascia. In the subcutaneous tissue localised abscess occasionally resulted. If allowed to scab over, the destructive process extended beneath the unhealthy crust. In many cases these sores were very numerous, and repeatedly recurred in the same individual. As a rule they were practically painless, but when occurring on the knuckles or in other parts liable to constant movement, they were prone to develop into deep and painful fissures. Troublesome though they were, veldt sores proved very amenable to treatment. The separated cuticle was cut away, the surface of the sore thoroughly cleansed by bathing with a solution of carbolic acid, perchloride of mercury, or boracic acid, and then covered with a dressing of dilute nitrate of mercury ointment or a gauze dressing. In a very few days the sore had healed, and a white superficial scar remained.

Diseases of the Teeth.

Caries of the teeth were extremely common, and became more so as time went on, since it was dependent in the main upon the nature of the diet, the

hardness of the ration biscuit (causing fracture), and the practical absence of tooth-brushes from the men's kit. I understood, but cannot vouch for the accuracy of the statement, that the climate of South Africa is a strong predisposing factor in dental caries.

Among our casualty cases we had a very large number of tooth extractions, for it was impossible on the march to attempt anything in the way of conservation dentistry, although in some slight cases of caries we gave temporary relief by cleansing and plugging the cavity with pure carbolic acid until such time as the sufferer could avail himself of the services of an expert dentist in Pretoria or some other town.

In many cases artificial teeth were rendered useless, as the dentures were broken by the hard biscuits. It is to be desired that in the future a few skilled dentists should be associated with the base hospitals, for the soundness of a man's teeth is of the first importance, especially in view of the nature of the diet he must perforce take while on active service. Bad teeth mean imperfect mastication, and this leads to dyspepsia, and, in time, to more or less malnutrition and debility necessitating invaliding to the base.

MEDICAL REPORT.

By FREDERICK GREEN, B.A. Dub., M.D., B.Ch.,

Surgeon to the Bearer Company.

Simple Continued Fever.

Under simple continued fever are included all cases which had fever, of whatever degree, with its commonly associated symptoms, but in which no definite diagnosis could be arrived at during the short time the patients remained in the Field Hospital. The term was a purely tentative one, dictated by the form of the army returns; it practically implied nothing more than the existence of the febrile state, and conveyed the information that the case was not yet diagnosed.

During the latter part of our work in South Africa such cases were returned (according to orders) as 'not yet diagnosed' in place of S.C.F. Our statistics show that we passed through the hospital 265 cases of this description, and it is only necessary here to shortly indicate the various pathological conditions which were probably included under this general term, and which would be differentiated within a few days after the admission of the patient to a base hospital.

Some of these cases convalesced in a few days, the only symptoms being slight fever, headache, nausea, and pains in the limbs, and no doubt were attributable to exposure, to the effects of the sun, and in some instances to temporary derangement of the intestinal tract, any of which conditions would rapidly pass off when the patient was given a few days' rest under canvas, with better feeding than was usually afforded on column. But such cases were but a small minority.

It is more than likely that the great majority of our S.C.F.'s eventually proved to be cases of enteric fever. We knew this to have been the case with a large number of the patients whom we sent into Pretoria from time to time, and of whose progress we were able to ascertain some time later.

Malaria, influenza, rheumatism, and other diseases with which fever is commonly associated, must also be regarded as claiming a certain proportion of the cases.

Before leaving this subject we venture to suggest that all cases, the nature

of which is doubtful, should be described as N.Y.D., and if fever be present this fact should be stated when the patient is transferred from the field to the base. It would be a further advantage if each patient sent from a field hospital without a definite diagnosis was given a card shortly stating the prominent symptoms and presumed diagnosis. Such a method was carried out by us as far as possible, and can be adopted with but little trouble in the first instance, and undoubted subsequent benefit and saving of time.

Enteric Fever.

Our returns show thirty-three cases diagnosed as enteric. This number, however, only includes such cases as came under our notice in the field when the diagnosis was certain; what proportion of cases transferred by us as Simple Continued Fever, or Not Yet Diagnosed, proved eventually to be enteric, we cannot of course say, but doubtless the percentage was large.

It is not within the scope of this report to enter into a discussion as to the course, &c., of enteric as it occurred in South Africa, for in a field hospital opportunities of watching such cases are necessarily denied, and our information was derived from the experience of others, and from what we saw in the base hospitals. Complete information on this subject will be found in other parts of this volume. We propose, however, to state the opinions we formed as to the spread of the disease. While it is universally conceded that water is *the* means of disseminating enteric, yet there can be but little doubt that in South Africa infection was spread by dust and flies, although perhaps undue prominence has been given to these agents by some writers.

If an enteric stool is capable of contaminating water, and thus spreading the disease, it is logical to assume that when desiccated in the dry air in South Africa, and blown about with dust, it is equally potent for harm, and also that the poisonous material can be conveyed by flies, which seem to be attracted to enteric excreta like iron by a magnet.

Infection through the medium of dust or flies is especially likely to occur in large standing camps in which the ground was too often fouled, and the open latrines were constant sources of infection. It is worthy of note in this connection that in such camps the water supply is for the most part looked after and protected. Yet, as we shall presently state, standing camps were the great sources of enteric infection.

As regards infection through flies, it is noticeable that during the summer months the flies were present in myriads, and it is no exaggeration to say that in some places, notably Machadodorp, it was a fight for the daily ration between man

and the fly. It was during the summer months that enterie was at its height, but it must also be remembered that it was also the time of the ineidence of rain, and hence the greater likelihood of eontamination of the water.

As we have already said it was very noticeable to us that in the great majority of eases, indeed in all those oeeurring among the men of the Field Hospital and Bearer Company, the disease was not contracted on column, but in large standing eamps, as at Bloemfontein, Pretoria, and Maehadodorp, nor is it diffieult to find ample reason for this, quite apart from the greater massing together of men. In such camps the ground is usually foul, open latrines are plentiful, men are crowded together in huts, using the same eooking apparatus, and having every opportunity of spreading infeetion. Further the eonditions of life are less arduous, and henee men are likely to eontinue with the disease on them for a longer period before going siek, than would be the ease if performing constant and harassing duty in the field; hence they remain free among their fellows, to disseminate the poison, and to produee a condition of general infection of such camps.

On column the eamping ground is rarely oecupied more than a few hours, and is itself elean, and when the column moves on, it leaves its own eontamination behind it. As regards the conveyanee of enteric and other diseases by water, it is mueh to be hoped—indeed, it is to be strenuously urged—that in the future some seheme may be adopted to purify the water by boiling.

It will be freely admitted by all who are acquainted with the conditions that maintain on column, when in active pursuit of an enemy, that purification of the water as suggested, would present diffieulties, but from practical experienee in this direetion we are convineed that these difficulties can be overcome with effieient organization and a determination to do all that is possible.

In standing camps there can be no sort of difficulty in purifying the water, and this at small eost and little labour, both of which would prove in the end to be an immense saving, for if water-borne diseases can be in a large measure prevented, the saving effected in hospital organization, transport, and equipment, would leave a large balanee in hand. But if on financial grounds the purifieation of water is shown to be a politie measure, how mueh more is it to be demanded when we turn to the eonsideration of the enormous saving in health and life?

Dysentery.

Sixty-five cases diagnosed as dysentery eame under our care. The eases were characterised by profuse diarrhœa, the passage of slime, and small quantities of blood, and usually, in acute cases, by slight fever. Chronic dysentery was common, and many of the casualty patients were treated for this condition while on the

marcli. In one of our cases at Machadodorp the patient had suffered from chronic dysentery for some weeks, and was admitted to the hospital with liver abscess; the spleen was also enlarged. In two others there was enlargement of the liver with considerable pain, but no fever; and in neither did we suspect suppuration when we sent these cases to the base.

In acute cases the onset was often heralded by slight looseness of the bowels on the previous day.

With the onset of the disease, the patient was seized with colicky pain in the abdomen, and in some cases there was continuous pain of a more or less severe nature in the hepatic region. Diarrhœa was profuse and exhausting, in some cases from thirty to forty stools a days were noted: these were at first rather enteric in nature, but very soon they consisted of little but mucus, and perhaps some blood. Smarting and burning pain was often experienced at the anus. Physical prostration and weakness were rapidly induced; a man who had risen well would, by the evening, be so weak he could hardly stand. Rapid loss of flesh was also very evident, headache more usually in the occipital region, nausea and sometimes vomiting were present, and the patient not infrequently craved for food which he turned from, nauseated, when it was given. The abdominal pain was sometimes so severe as to necessitate the employment of morphia hypodermically.

As regards treatment, we kept these patients on milk diet, and administered sulphate of magnesia in drachm doses every hour until amendment occurred, which it usually did in about twelve hours. In chronic cases we found much benefit from the use of pulv. ipecac. sine emetine in fifteen-grain doses night and morning. As soon as opportunity occurred all cases of acute dysentery and severe chronic cases were sent to the base.

Diarrhœa.

Diarrhœa was an incident of the campaign which few escaped. Some suffered from it at intervals throughout, others had perhaps two or three smart attacks at long intervals, while the fortunate majority were not troubled after one attack, which usually occurred soon after entering the country.

So common was diarrhœa, that unless it was of a severe type or a first attack, its occurrence was looked upon by the men as simply a nuisance, but in other respects was disregarded. In many cases no doubt the milder forms of diarrhœa were due to climatic conditions, and to diet, to both of which the patient speedily became habituated.

The condition known as 'Modders' (from its prevalence at Modder River) was doubtless a form of septic enteritis, allied to dysentery, aggravated perhaps by the mechanical irritation of sand in the intestinal canal (sand

diarrhœa). The infective agent, whatever it might be, was doubtless carried by the same agencies as the typhoid bacillus.

'Modders' varied much in severity. In the mildest form there was profuse diarrhœa, colicky pains in the abdomen, nausea, occasional vomiting, and perhaps slight fever.

The effect of castor oil and opium, combined with temporary starvation, was excellent and immediate; the patient after a free evacuation of the bowels rapidly convalesced, and was rarely on the sick list more than a couple of days. We had ample opportunity of observing such cases among our own men, and others in our camp at Bloemfontein. But in some instances the case proved more resistant, the diarrhœa, perhaps temporarily checked for a day or two, recurred, and became chronic; more or less mucus was in such cases usually voided. This condition, with its associated nausea and disinclination for food, eventually induced deterioration of the general health and anæmia. Of such cases we saw many, and invariably sent them to the base when opportunity offered.

In the more severe cases of 'Modders,' the symptoms were practically identical with those of dysentery; indeed, judging by clinical manifestations alone, we feel certain that these two conditions are pathologically closely allied, although it be admitted that their causation differs. It is worthy of note that the natives were, as far as our experience went, practically exempt from this affection, we certainly never saw any native with the severe form.

During convalescence from 'Modders,' the patients complained of great hunger, which is so distressing in the corresponding period of enteric, and which similarly had to be restrained.

As regards the question of diet in such cases, there can be little doubt that practical starvation from the outset is of great importance. When the disease became chronic, we always, as before mentioned, invalided our patients to the base, provided that a fair trial of mag. sulph. in drachm doses every two hours, or pulv. ipecac. sine emetine gr. xv., twice or thrice a day, was not productive of beneficial results.

It must not of course be overlooked that perhaps a large number of the cases which in our returns were classed as diarrhœa, and which were transferred to the base, doubtless proved to be enteric, although, be it noted, constipation was more common among enterics in South Africa than was diarrhœa.

Malaria.

The Barberton district, the Magaliesberg and Rustenburg districts, and the Bush-veldt north of Pretoria, were the parts of the Transvaal in which

we saw service, which were specially credited, so far as we were able to ascertain, with being the homes of Malaria.

It was, however, practically only at Rietfontein, near Commando Nek, and in the Magaliesberg district, that we saw cases which we diagnosed, perhaps in some incorrectly so, as malaria. The reason of this is probably that at Rietfontein at least, we were camped during the rains; that is, at the time at which malaria was most common.

Our stay in the Bush-veldt between Pretoria and Nylstrom, was of short duration, besides being at a time of year when malaria was more talked about than seen. While we were at Barberton the men of the Field Hospital and Bearer Company were, in view of the malarious character of the neighbourhood, put on a daily dose of five grains of quinine, as a prophylactic, although the malarious season was not yet arrived.

We feel some diffidence in definitely asserting that the thirty-two cases which we have classed under the heading of malaria were all of that nature, for we could not keep these patients under observation for a sufficient length of time, nor could we in a field hospital carry out such observations as were necessary to establish the diagnosis beyond doubt. In the majority, however, the diagnosis was confirmed from observations in the base hospital. As a set-off against this reservation, we may confidently state that some, how many it would be impossible to say, of our cases returned as simple continued fever eventually proved to be malarious in nature.

Our diagnosis of malaria rested upon the sudden onset, the high fever accompanied with rigor, and to some extent upon the reputed nature of the neighbourhood. Many of these patients complained of severe pains of a rheumatic character in the muscles; in others jaundice supervened within a couple of days, and it is possible that some of these cases at least would in England have been diagnosed as influenza.

Rheumatism.

We only had two cases of acute rheumatic fever. Of our sixty-eight cases classed as rheumatism the symptoms were purely subjective, the patients complaining of muscular pains, sometimes general, and at others confined to the loin and back, or to the limbs.

Some of these cases were perhaps dependent on insolation, and should hardly be classed as muscular rheumatism; and at Rietfontein we had many patients suffering from malaria, and it was very noticeable that many such complained of severe muscular pains of a rheumatic character. Our cases of muscular rheumatism

chiefly occurred during the rains, as the men were frequently wet through, and had to sleep on damp ground. The dry, frosty nights of winter did not affect those rheumatically inclined.

In the cases which we admitted to hospital for this affection there was no doubt as to the reality of the pain. We mention this because pains in the limbs, &c., from the impossibility of their existence being denied without further observation, were often complained of by men who were anxious to obtain a short respite from the constant trekking, by being sent to the base.

Diseases of the Respiratory Tract.

It might be supposed that the exposure, privations, and hardships of a campaign would entail a considerable amount of disease affecting the respiratory tract. The comparative absence of such in the South African campaign was most noticeable, but a little reflection will show ample reasons why such disease was, to use a bad phrase, conspicuous by its absence. Men who had weak chests were refused enlistment, and those who happened to pass the examining officer benefited in the most extraordinary manner, as we had the opportunity of seeing, by the sea voyage, the open-air life, and perhaps more than anything by the South African climate.

Such considerations far outweighed the drawbacks of campaigning; for with all its privations, the men lived the most healthy of lives, they were efficiently clad, and their food, if monotonous, had the cardinal virtues of being good, nourishing, and sufficient. These advantages, which can hardly be over-estimated, coupled with that physical exertion which does all who are capable of enduring it inestimable good, were a paramount set-off against the occasional drenchings in the heavy rains, with no clothes to change, and no time to change them had they been available. It is these considerations which conferred immunity against serious disease of the respiratory tract.

Of the twenty-nine cases of catarrh which came under our care, none, it is needless to say, were serious. We admitted these men to hospital, because we felt that they might, if not removed from outpost duty and the bivouac, develop more serious trouble. They were such cases as in ordinary civilian life would hardly need the services of a doctor; but in the field, a man if not absolutely sound may possibly be a source of danger, and we felt that, putting the patient himself aside, it was a wiser policy to admit him to hospital, where he at least got shelter after the day's march, than to risk anything by not so doing. Many of these cases had slight fever and rheumatic pains, indeed were in a condition which at home, for want of more accurate diagnosis, would be termed influenza.

Bronchitis was a further stage in this condition; we never saw a febrile case,

indeed our cases should be more properly classed as bronchial catarrh. Of pleurisy we saw only two cases; they were both slight, but after we had sent them to the base, we lost touch of them, and are therefore unable to say what their subsequent progress was, but considering that their condition when they left us was very favourable, we cannot but think that they speedily recovered.

Of acute pneumonia, apart from injury, we had six cases. Fortunately we were enabled to leave these patients at a stationary hospital, or send them to the base without delay, with one exception, and this in the case of a native driver.

A Basuto, aged eighteen, was admitted into the hospital at Machadodorp with acute pneumonia of both bases. Although this man was extremely ill, he retained his strength, could not be kept quiet, and while the orderly's back was turned to attend to another patient, left the tent, and went to the latrine, which was some fifty yards away. Directly his absence was noted by the orderly, he went in search of him, and as he approached the returning native, the latter fell dead from cardiac failure.

This is a fair instance of the manner in which the natives, taken as a class, treated disease or injury to themselves. They seemed but little affected, and practically ignored a condition of things which would prostrate a European, and hence, although we found them grateful, and to a certain extent tractable patients, yet we entirely failed to impress upon them the seriousness of their condition, or the need of carrying out orders. And this we believe to be due in a large measure to the fact that the native is self-contained, he retains his fatalism, his faith in the witch-doctor, and his distrust of the European, even in the greatest crises. That he is a fatalist seemed evident to us from many cases of disease and wounds among the natives which we saw.

We saw only one case of phthisis. This patient was very ill, and we admitted him for profuse hæmoptysis, sending him immediately to Pretoria.

Nervous Debility.—Neurasthenia.

Thirty-eight cases of 'nervous debility,' were admitted into hospital, and sent to the base for a period of rest and further observation. These patients suffered in varying degree from nervous exhaustion induced by numerous causes: we saw no case of mania, although we heard of many such.

The mental depression and general nervous exhaustion which these patients exhibited varied in severity and prevalence, according to the circumstances under which the men had been working for some time previously. Hard and constant marching, frequent outpost and picket duty, little sleep, constant anxiety, the presence of a well-concealed enemy and the daily sniping, were all circumstances, *inter alia*, calculated to try the nerves of most. The men with the least nervous energy were in time used up *physically* and morally, those with the most grew

'stale.' We could roughly divide our cases of nervous debility into two groups. The one set of patients were dull and lethargic, exhibited no interest in their surroundings, and seemed to care but little for the progress of events, or what might happen to themselves; indeed they verged on a condition of melancholia. The second group were excitable and 'jumpy,' a term perhaps indefinite, but which all who have been on column will readily understand: they were markedly influenced by external impressions, dwelt on and exaggerated the events of previous days, and were apprehensive of the future. In some cases we saw the patients were perpetually expecting an attack from the enemy, the crack of a whip would sometimes produce mental excitement, as it suggested rifle fire. During the rains the frequent and terrific thunderstorms had in many cases a marked effect on the nervous system, and no wonder considering how often men and animals were struck and frequently killed by lightning.

General Debility.

Many patients suffered from general debility, and in those cases, which we sent to the base, there was also nervous exhaustion. General debility was undoubtedly due in many cases to long service, inclement weather, monotonous diet and largely to dyspepsia. Dyspepsia was not only dependent upon the nature of the food but upon the state of the teeth. The ration biscuit, excellent though it is, played havoc with the teeth, and in many instances deprived such as wore them of their artificial teeth, as they are so hard that the dentures soon broke. Under this heading we must however refer to 'skrimshanking.' 'Weakness, pains in the head and giddiness,' were the constant symptoms exhibited by many of our casualties. Some also experienced pains all over and other subjective symptoms. Such cases we usually kept under observation for some days, giving them shelter at night and small luxuries in order to satisfy ourselves as to the real condition, as we always gave a man the benefit of the doubt when malingering was suspected.

Chorea.

One case of chorea was admitted to the hospital. It was that of a trooper, aged twenty-three, and was the second attack he had had during the campaign. The first came on some months previously after a severe engagement in the Orange River Colony; he was then invalided, and returned to duty in about six weeks. During the interval he was in perfect health, and had full control of his movements. When he was admitted there was a history of loss of control over his left arm and leg which came on suddenly while on picket duty near Machadodorp.

During his stay in our hospital he developed choreiform movements of the face, the right arm and the legs.

This case is interesting in that there was a distinct history of what may be called emotion or fright before each attack. One of his companions said that he had been of a very 'jumpy' nature during the time he was on trek.

Sore Throat.—Tonsillitis.

These affections were fairly common, and in one or two cases tonsillitis was pretty severe, and accompanied by high fever. Many mild cases came under our notice, and appeared to be due to the inhalation of dust. The severer cases suggested a septic origin, and resembled in their general character the ordinary hospital sore throat. Not a few of the men who came to us complaining of sore throat were admitted a few days later with rheumatism.

Jaundice.

Jaundice was especially common in December and January (1900–1901). Many of the patients exhibited no other sign; they did not complain of pain, nausea, or even dyspepsia, and were enabled to do their ordinary work. In the ten cases we sent to the base there was a slight degree of fever, nausea, vomiting, and epigastric tenderness, and in some there was general tenderness over the hepatic region, but no obvious enlargement of the liver. Such cases we attributed to gastro-duodenal catarrh, with consequent blocking of the orifice of the bile-duct. Some of these patients also suffered from what was diagnosed as malaria, the jaundice supervening after the patient's admission to the hospital.

Ptomaine Poisoning.

While we were in camp at Green Point, Cape Town, there were several slight cases of ptomaine poisoning amongst the *personnel* of the Field Hospital and Bearer Company. These cases, which are not included in our statistical return, were caused by craw-fish which had been caught in Table Bay. Table Bay, it is well known, is a rich source of craw-fish; but since the war, so we were informed, the craw-fish had not commended themselves to the inhabitants of Cape Town, who had in many instances suffered as did our orderlies, and attributed their illness to the fact that the Bay was full of transports, and hence its waters were contaminated.

Our cases at Green Point were all slight, but unmistakeable; in one there was cramp in the legs, which caused such severe pain as to necessitate a

hypodermic injection of morphia. Of the three cases which we return in our Statistical Table, one occurred at Zoutpan (Transvaal), and was, so far as we were able to judge, traceable to a meal of mud-fish, a species of barbel, which inhabits the muddy bottoms of rivers and spruits, and which, in view of the practical absence of fish, was considered a delicacy.

Our other two cases, in default of all other cause, we attributed to the tinned foods. That we should only have met two cases which we could reasonably attribute to such cause, is eloquent testimony to the excellence of the tinned food supplied to the army; and when we consider the enormous quantity consumed, the different sources of supply, and the distance from which the supply was obtained, it is obvious that the quality was of a high standard.

Bilharzia Hæmatobia.

The Bilharzia is common in Natal and some parts of the Transvaal Colony. Although we are not in a position to definitely assert that we saw cases of its occurrence, yet we have reason to believe that three cases passed through our hands in the western Transvaal. These three cases occurred at Reitfontein, near Commando Nek, where we were camped for some five weeks after the reverse at Nooitgedacht.

We were told that the Bilharzia was met with in the district, and that it was not uncommon for the males resident in the neighbourhood to suffer from hæmaturia, which was attributed to bathing. During our stay here bathing was indulged in in the branches of the Crocodile.

The three cases we suspected suffered from hæmaturia, this being practically the only symptom they exhibited. They had no signs of organic mischief in the urinary tract, and were in other respects quite sound.

Two of these cases we were able to follow up after they had been transferred to the base at Pretoria. In both hæmaturia lasted for about a fortnight, gradually subsiding.

In these cases repeated microscopical examination (made in Pretoria) gave negative results.

FIELD HOSPITAL AND BEARER COMPANY.

Analysis of Cases of Sickness primarily under the Care of the Field Hospital and Bearer Company.

(This does not include any cases we saw or treated which did not come under our care from the first.)

General Diseases (373).

Continued fever[1]	157	Rheumatic fever	2
Enteric fever[2]	33	Rheumatism[3]	68
Dysentery	65	Venereal diseases	16
Malaria	32		

Diseases of the Respiratory Tract (61).

Catarrh	29	Pneumonia	6
Bronchitis	23	Hæmoptysis	1
Pleurisy	2		

Diseases of the Circulatory System (4).

Disordered action of the heart 4

Diseases of the Nervous System (51).

Nervous debility[4]	38	Epilepsy	2
Neuralgia	5	Unclassed[5]	6

Diseases of the Mouth and Throat (24).

Sore throat. Tonsillitis. Pharyngitis.

[1] Under this head are included all cases with fever the origin of which was undetermined when the patients were transferred. Doubtless many of these eventually proved to be enteric, some malaria, or other diseases accompanied by fever. A certain proportion of these cases convalesced in a few days, the rise of temperature and its accompanying general condition being the only symptoms.

[2] Under enteric fever only those cases are included in which the diagnosis was certain. (See Note [1].)

[3] Many patients who had malaria also suffered from rheumatism.

[4] By the term nervous debility is meant general nervous over-strain from constant hard work, &c., on active service. These patients were nearly always sent down to Pretoria for a few days' rest under canvas.

[5] Those conditions of the nervous system entered as unclassed were of a doubtful nature—vertigo, pain in the head, and similar conditions.

IMPERIAL YEOMANRY HOSPITALS.

Diseases of the Intestinal and Digestive Tract (148).

Diarrhœa[1]	108	Jaundice	10
Colic	13	Hepatitis	2
Dyspepsia	15		

Diseases of the Genito-urinary System (1).

Bright's disease	1

Poisoning by Ptomaines (3).

Total	665

[1] This term is used to indicate the most prominent symptom present. A large proportion of the cases were those of 'Modders' (a local term for septic enteritis). Many of those accompanied by fever doubtless proved in the end to be cases of enteric fever, and some developed into true dysentery.

PRETORIA DETACHMENT.—No. 3 MODEL SCHOOL, PRETORIA.

The detachment of the Field Hospital and Bearer Company which we left in Pretoria from the middle of July to the end of October, 1900 (see Vol. II. of Committee's Report), was lent to the R.A.M.C. authorities for service until such time as we should need their services in the field. On August 11th, Major Ford, D.S.O., R.A.M.C., was placed in command of this hospital and of our detachment. Mr. Openshaw left for England on August 21st, and Mr. Scot-Skirving, now convalescent from enteric, joined the detachment and continued working with it until his departure for England on October 19th. The detachment rejoined our camp at the end of October, after practically three months' work at No. 3 Model School Hospital, during which period the officers and men had under their special care 436 cases.

The cases may be thus classed:—Surgical, 76; Medical, 360. Total, 436.

The following table shows how these patients were disposed of:—

Died	11
Invalided to base	135
Transferred to convalescent camp or other hospital	43
Returned to duty	226
Unaccounted for in returns	21
	436

The surgical cases are thus classed:—

Bullet wounds	15
Injuries	9
Surgical diseases	52
	76

Medical cases:—

Enteric fever	49	Diseases of the lungs	15
'Simple continued fever'	28	Debility	22
Dysentery	51	Jaundice	4
Diarrhœa	60	Diseases of the nervous system	5
Malaria	24	Disordered action of the heart	4
Rheumatic fever	2	Unclassed diseases	24
Rheumatism	56		
Diseases of the throat	16	Total	360

C. S.

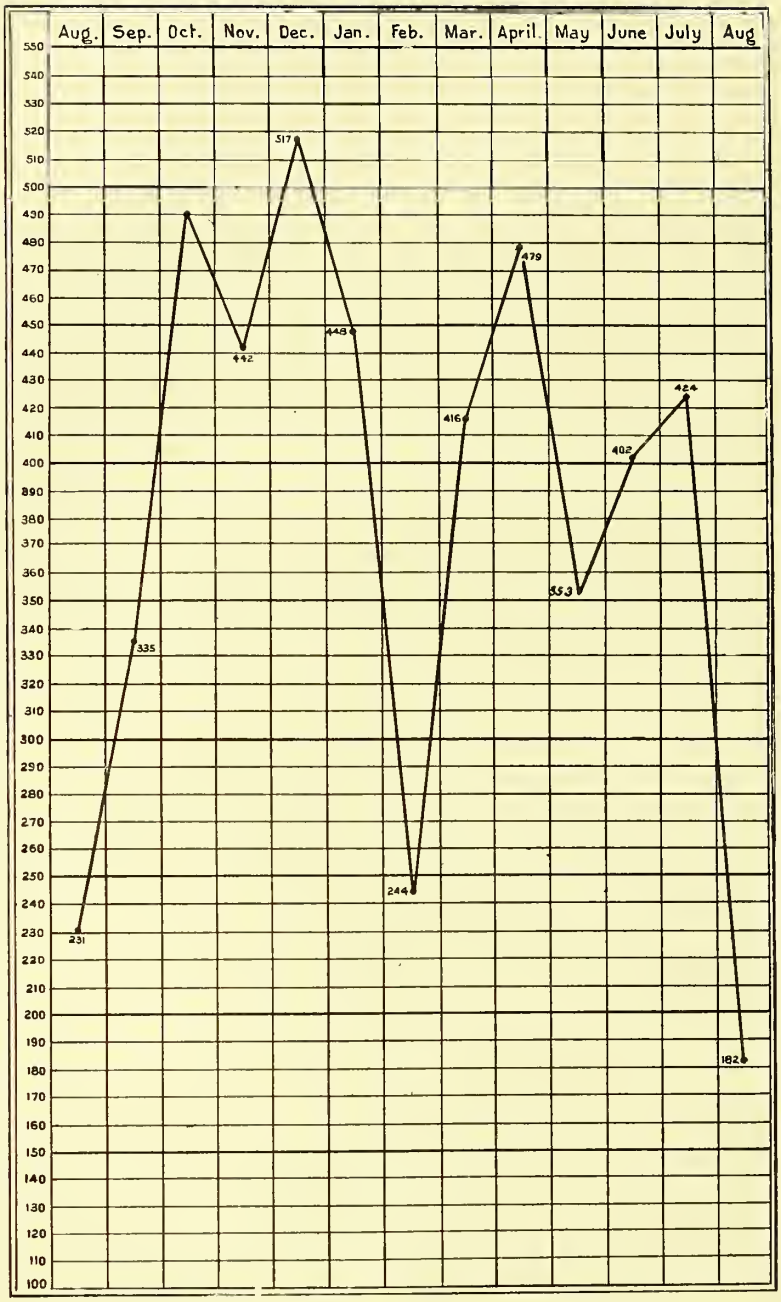


CHART 'A,' SHOWING TOTAL MONTHLY ADMISSIONS FOR ALL CAUSES.

[*See* page 177.

IMPERIAL YEOMANRY HOSPITAL, PRETORIA.

MEDICAL REPORT.*

By the late J. W. WASHBOURN, C.M.G., M.D., F.R.C.P.,

Consulting Physician, Sept. 1900–*May*, 1901.

Physician to Guy's Hospital, and to the London Fever Hospital.

AND

H. D. ROLLESTON, M.D., F.R.C.P.,

Consulting Physician, May–Sept. 1901. *Physician to St. George's Hospital.*

With Appendices by Dr. G. E. Richmond *on 'The Treatment of Dysentery by Sulphur,' and* Dr. W. Langdon Brown.

This hospital was opened on August 18th, 1900. From this date up to September 25th 1901, 5106 patients were admitted. These patients consisted of:—

Officers	543
Men of Imperial Troops	3849
Men of Colonial Troops	7145—106

No distinction is made between officers of the Imperial and officers of the Colonial Forces, as the latter are frequently drawn from the former. Of these 5106 patients, there were 1057 officers and men belonging to the Imperial Yeomanry.

In addition to the 5106, there were 200 patients under treatment in the hospital; consisting of sisters, men not belonging to his Majesty's troops, camp-followers, and civilians. There were also rather over 1000 out-patients. The grand total of patients treated in the hospital thus comes to about 6306.

Chart 'A' (opposite) shows the total admissions per month.

* This report was completed before the illness and lamented death of Dr. Washbourn.

The maximum admission was in December, when it reached 617, and the minimum (excluding the months of August in both years, as the first patients were admitted on August 20th, 1900, and practically no patients were admitted after August 24th, 1901) in February, when it fell to 244.

It must be remembered that the admissions into any one military hospital on active service are not necessarily an index of the prevalence of disease in the army; they depend to a great extent upon the movement of the troops and the transfer of cases from hospitals in other parts of the country.

CHART 'D' SHOWS MONTHLY DEATHS FROM ALL CAUSES.

We have divided our cases into medical and surgical. The latter include all diseases of the eye, ear, teeth, as well as cases of appendicitis.

Of the 5106 cases, 3782 were medical; 1324 were surgical. There were thus nearly three times as many medical as surgical cases.

There were in all eighty-eight deaths, giving a death-rate of 1·72. Chart 'D' shows the monthly deaths from all diseases. The deaths from enteric fever constituted 62·5 p.c. of the total deaths.

This report deals with the medical cases, the surgical cases being reported elsewhere.

PRETORIA—MEDICAL DIVISION.

Chart 'B' shows the monthly admissions of the medical cases, the curve of which corresponds in the main with that of the total admissions.

The maximum monthly admissions (452) of medical cases was reached in December, 1900, and the minimum (192), excepting the months of August, in February. The small number of patients taken in during February did not depend so much on diminution of disease as on the movements of the army. During this month a large number of columns were operating under General Freneh in the S.E. Transvaal, and their sick and wounded were taken into Natal, Standerton, and Johannesburg, and did not come to Pretoria in the first instanee. After the acute stage had passed, large transfers were made into this hospital, and helped to swell the returns of Mareh and April.

The following table shows the admissions from various medical diseases:

Enteric	...	692
Dysentery	...	475
Debility	...	399
Malaria	...	394
Rheumatism	...	369
Simple Continued Fever	...	200
Diarrhœa	...	165
Jaundice	...	116
Tonsillitis	...	120
Influenza	...	111
Bronchitis	...	61
Rheumatic Fever		6
Scarlet Fever...		4
Measles	...	6
Other Medical Diseases	...	664

The principal diseases were enteric, dysentery,

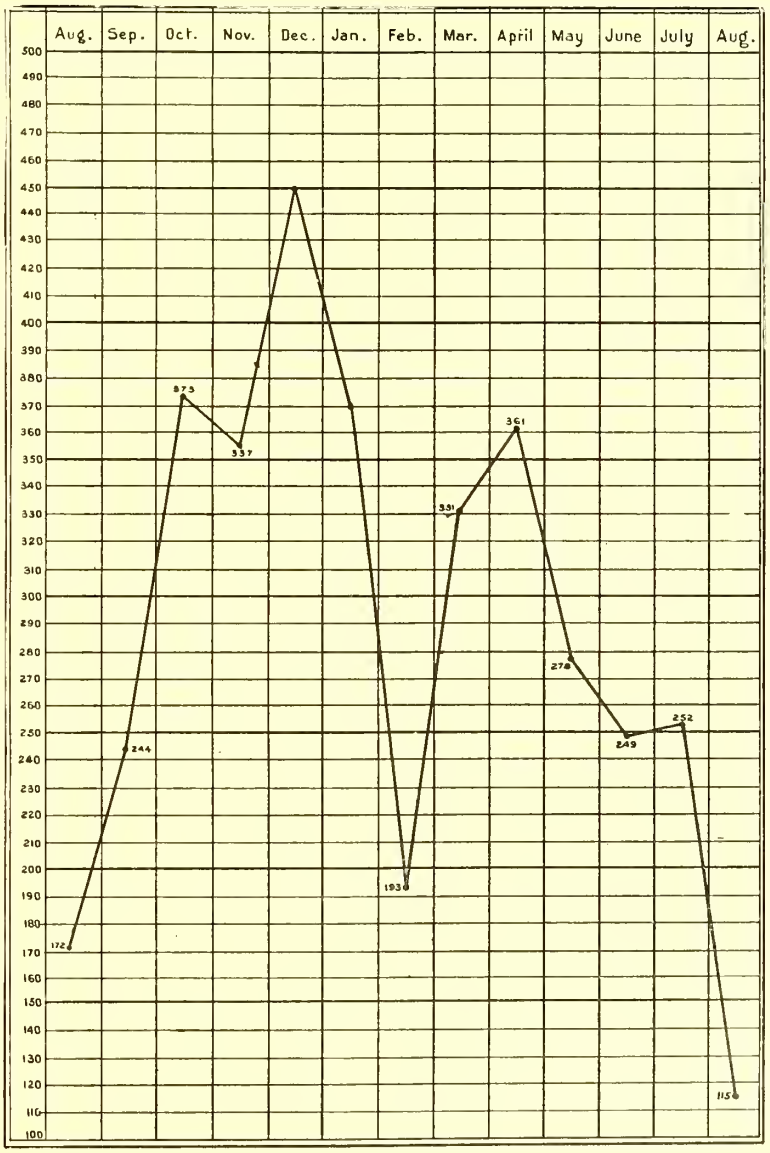


CHART 'B,' SHOWING TOTAL ADMISSIONS FOR MEDICAL DISEASES.

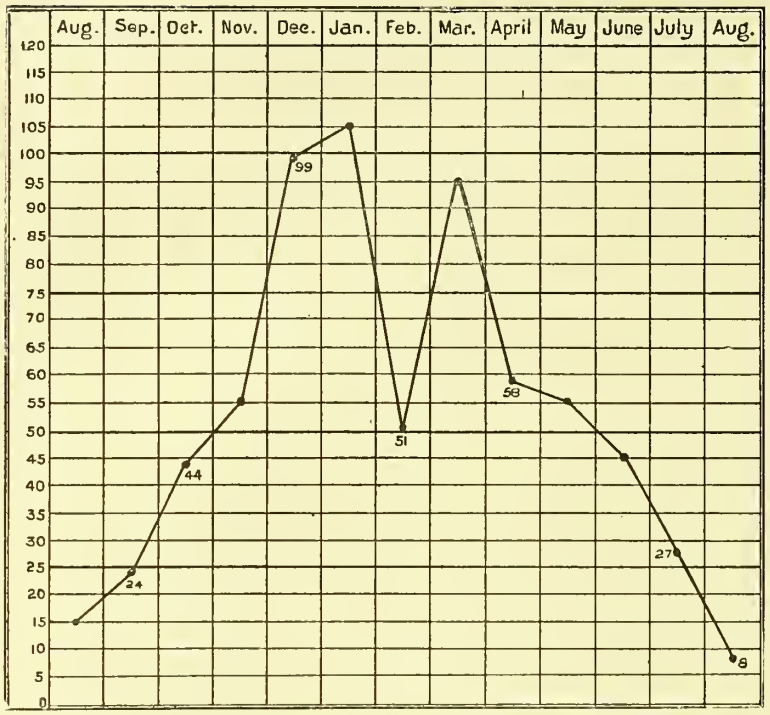


CHART 'E' SHOWS MONTHLY ADMISSIONS FOR ENTERIC FEVER.

debility, malaria, rheumatism, simple continued fever, and diarrhoea. We will consider these diseases separately.

Enteric Fever.

The monthly admissions and the monthly deaths from enteric fever are shown on Charts 'E' and 'F.' The total admissions were 692, but of these 385 were transferred, frequently convaleseent, from other hospitals. The total number of deaths was fifty-five, the death rate per ease incidenee being 7·93% for the whole 692, but 17·5 for the 307 eases admitted in the first instance, and consequently in the acute stage, to this hospital. It is noteworthy that the deaths from enteric fever (55) constituted 62·5° of the total deaths in the hospital.

It will be seen that the admissions gradually increased to a maximum in December and January, with a sudden fall in February and a sudden rise in Mareh. The rise in Mareh was due to the admissions of a number of convaleseents from other hospitals. This explanation is supported by

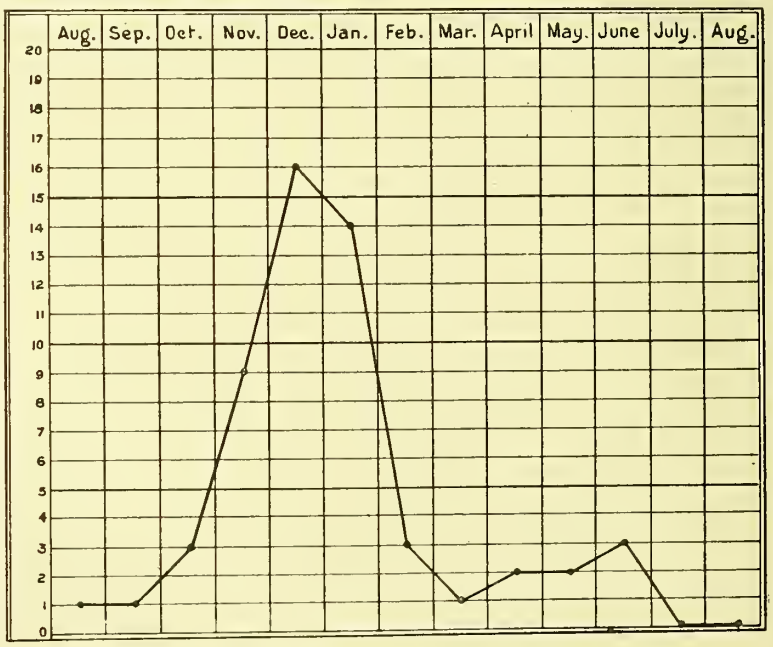


CHART 'F' SHOWS MONTHLY DEATHS FROM ENTERIC FEVER.

the death-rate curve, which corresponds to the admissions curve, except in March, the death-rate in this month being very low, while the admissions were very high. As would be expected, from the large number of cases of enteric, its admission curve in some measure corresponds with that of the total medical admissions.

Of the large number of cases of enteric fever treated in this hospital, a considerable proportion were received as transfers from other hospitals in a condition of convalescence. The actual notes of all the cases in the hospital are therefore not available for examination and analysis.

Though the enteric fever met with in South Africa presents some divergence in type from the disease as seen in England, the resemblance in the clinical aspect, morbid anatomy, and bacteriological characters is so close as to leave no shadow of doubt as to their essential identity.

The Occurrence of Second Attacks.—A previous attack of enteric fever in England, Egypt, or even in South Africa itself, does not necessarily protect the individual against enteric in South Africa. There have been numerous cases in this hospital in which the same patient has had two attacks during the present campaign. Example:—

A Lieutenant, aged 20, inoculated March, 1900, had enteric in May, 1900, and was invalided home. He returned to South Africa, and in May, 1901, had a second and mild attack of enteric fever.

The second attack may be more severe than the first, and prove fatal. Furthermore, the second attack may be mild and then be followed by a severe relapse.

A Lieutenant, aged 26, had had enteric at Kimberley in 1900, followed by a relapse at Deelfontein. About a year later (in May, 1901) he had enteric again. This attack was mild, but was followed, after an interval of twenty-four days of normal temperature, by a severe relapse, with a raised temperature, lasting twenty-six days.

Anti-typhoidal Vaccination.—Though this method of treatment is still on its trial, and must be judged by statistics showing the incidence of enteric fever in large bodies of men, inoculated and not inoculated, our own statistics are worth recording.

Among the *personnel* of the hospital (17 medical officers, 50 nursing sisters, and 83 orderlies, &c.) there were twenty-two cases of enteric fever, or an incidence of 14·6 %. Of the 150, thirty-five were inoculated, and of these six, or 17 %, suffered from enteric; while of the 115 non-inoculated members, sixteen, or 13·9 %, suffered from enteric fever. The percentage is therefore higher among the inoculated. There were two deaths in the twenty-two cases of enteric occurring in non-inoculated patients, but none in inoculated.

Of 100 cases of enteric fever among non-commissioned officers and men,

taken mainly from convalescent patients, only eight had been previously inoculated. There were three fatal cases, all among non-inoculated patients.

Among forty-two officers who had enteric no less than nineteen had been previously inoculated, six of these nineteen cases were severe in character, but none were fatal; of the twenty-three non-inoculated cases seven were severe, and of these seven three ended fatally. The incidence of enteric fever in the nineteen inoculated cases varied between one and twenty-one months after inoculation, but in only four instances was the interval less than six months. The average interval between inoculation and the onset of enteric fever in these nineteen cases was thirty-eight weeks.

As far as these scanty figures go, they point to the conclusions (1) that antityphoidal inoculation does not protect against a future attack of enteric fever, (2) that when enteric occurs in an inoculated person there is, as a rule, an interval of at least six months. (3) That inoculation protects against a fatal termination to the disease.

Of the cases of enteric fever admitted into the hospital the notes of many were incomplete or missing, but we have examined and append the following analysis of 244 cases, the notes of which were complete.

Relapses.—Among the 244 cases there were fifty-two relapses, a percentage of twenty-one. This is a high percentage. In his recent analysis of 829 cases of enteric fever, Osler found the percentage of relapses to be a little more than ten. (Osler, *Johns Hopkins Hospital Reports*, vol. viii., p. 430, 1901.) The total of 244 cases includes a certain number of patients who had suffered from the primary attack at other hospitals, whence they had been transferred during early convalescence and relapsed shortly after admission. We do not think that the cases of enteric primarily admitted into our hospital are likely to have relapsed after discharge: for as the hospital was a base hospital we were able to keep the patients in until the danger of relapse had passed. The true incidence of relapse ought then to be counted only upon the cases primarily admitted into the hospital, and consequently the percentage twenty-one per cent. is higher than the true incidence of relapse.

Remarks on Peculiar Features, Symptoms, Complications, and Sequelæ.

In some, though in a considerable minority, of the cases where the onset could be observed it was quite sudden.

Enteric Fever among In-patients admitted for other Diseases.—In several instances patients who were admitted suffering from other diseases, developed

enteric fever whilst in hospital. In some of these cases the enteric fever as judged by its incubation period, was contracted before admission.

In the following cases the interval between admission to the hospital and the first signs of enteric fever, as determined by examination of the temperature charts, shows that, even if the incubation period of enteric fever be taken to be as long as twenty-three days, the infection must have occurred in the hospital. When the frequency of dust-storms and the plague of flies are considered as means by which enteric fever can spread, it is not to be wondered at that the disease should sometimes attack the patients in a hospital.

No.	Original Disease.	No. of Days after Admission on which Enteric Developed.
1.	Dysentery	51
2.	Dysentery	45
3.	Dysentery	35
4.	Dysentery	51
5.	Dysentery	25
6.	Debility	36
7.	Erysipelas	34
8.	Headache	70
9.	Malaria	44
10.	Tuberculous glands (operation)	43
11.	Fractured Tibia	26

In addition to these cases there was one, that of a convalescent officer who went into Pretoria and drank soda water; fourteen days later he developed enteric fever. As bacteriological examination of the soda water showed it to be contaminated, and there were other reasons for believing that it caused enteric, it is quite possible that this patient owed his attack of enteric to this cause.

Among the tabulated cases of enteric fever contracted in this hospital, five, or nearly half, originally suffered from dysentery. This would tend to support the wide-spread belief that enteric may be more readily engrafted on an unhealthy than on a healthy alimentary canal.

In some cases it appeared that dysentery and enteric fever had been contracted at about the same time, and that the comparatively long incubation period of enteric fever (8–23 days) accounts for the fact that the enteric fever appears a considerable time after the dysentery.

Thus a man aged twenty-one years was attacked with dysentery on April 30th, 1901, and was treated for this disease at Middelburg until May 15th, when he was transferred to this hospital for change of air as convalescent. On admission his temperature was raised, and he died on May 24th from hæmorrhage due to enteric fever.

The temperature of the enteric fever patients was often extremely irregular; extensive and rapid oscillations occurring within twenty-four hours without any manifest cause. In a few cases only were these oscillations due to concomitant malaria, as was shown by microscopic examination of the blood.

Several patients have been observed carefully during the incubation period of enteric fever, and it has been noticed that during this time short febrile attacks have occurred.

An Officer, aged 27, who was taken ill on January 11th, with malaise and pains all over the body, was admitted into the hospital on January 14th, the temperature on that evening reaching 101°. From January 14th to January 19th the evening temperature was about 100°, and the morning temperature was normal or subnormal. During this period there were no particular symptoms, and not the slightest indication of enteric fever. The bowels were constipated and required an aperient. On January 20th the temperature was subnormal, and remained so for four days, during which time the patient was feeling perfectly well, was up, and was taking ordinary diet. The temperature rose again on the evening of January 24th to 100·2°, and from this time it gradually rose in a staircase fashion, and a typical attack of enteric developed.

We have observed these cases both among the inoculated and the non-inoculated. What is the actual nature of this primary fever? Is it simply an indication of changes occurring during the incubation period of enteric, for changes certainly must be taking place during this period? Is it an abortive attack of enteric, the succeeding illness being a relapse, or is it quite an independent affection such as influenza. We can readily suppose that the body is especially liable to a chance infection, or to a recrudescence of any latent disease during the incubation period of enteric fever. In one case, of which we have full notes, a well-marked attack of remittent malaria with parasites in the blood occurred during the incubation period of enteric fever. The patient had previously suffered from many attacks of malaria.

Sometimes during convalescence evanescent rises of temperature lasting for two or three days without any assignable cause such as constipation or any complication occurred. It is possible that these represent abortive relapses.

Pulse.—A noticeable feature in many cases was the rapid pulse rate during convalescence becoming more manifest when the patient was first allowed to get up. Very possibly this rapidity of pulse, which often reached 120° without any evidence of dilatation or of organic valvular disease of the heart, was connected with the continued hard work involved in 'trekking' previous to the onset of enteric. In fact, one could frequently guess whether a convalescent patient had or had not been on the 'trek' shortly before his illness by the pulse rate. In patients who had not been marching or undergoing severe exercise for some time before admission for enteric the pulse was slow in convalescence; it therefore seems improbable that the altitude

of the hospital (4000 ft. above sea level) had anything to do with increased pulse rate, as suggested by Dr. Tooth in the report of the Portland Hospital.*

In many instances this rapid heart's action was associated with flatulent dyspepsia, and seemed to be aggravated by it, inasmuch as treatment of the dyspepsia was often followed by slowing of the pulse rate. The quickened pulse rate was not accompanied by unpleasant subjective symptoms, and the patients were often unconscious of it.

As regards treatment a return to bed was usually, but by no means always, followed by a fall in the pulse rate; tincture of Belladonna m. 5, three times daily, seemed to have a beneficial influence, while the treatment of any concomitant dyspepsia had, as already mentioned, a good effect.

Cardiac Failure was at one time (Dec. 1900–Jan. 1901) a comparatively frequent cause of death in patients who had been exposed to the fatigue of a long journey just before or after the fever.

Complications.

Diarrhœa and Constipation.—Diarrhœa was somewhat exceptional, and constipation was present in about ninety per cent. of the cases.

During convalescence attacks of diarrhœa sometimes occurred, and in many instances were probably due to excessive eating or to something unsuitable in the food. In this connection the following case is of interest:—

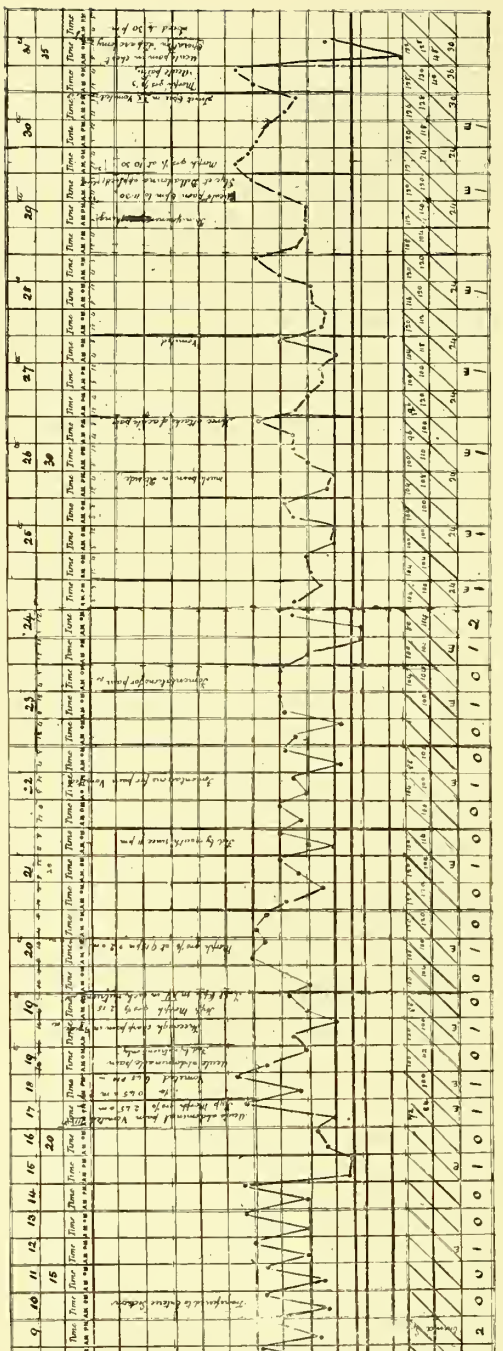
A man, aged 37, who had passed through an attack of enteric fever with a raised temperature for twenty-five days, was given a glycerine enema on the twelfth day of normal temperature for the relief of constipation. Eighteen hours later he was seized with diarrhœa, the motions being blood-stained. There was tenderness over the sigmoid flexure of the colon, a rapid pulse rate, and a temperature of 100°. This subsided after treatment with milk diet, rest in bed, morphia suppositories, and bismuth by the mouth. There had been an attack of dysentery seven months before.

It seems improbable that the irritating effect of glycerine should have been so excessive unless old dysenteric ulcers had remained latent in the sigmoid flexure, while the long interval of eighteen hours between the administration of the glycerine enema and the bloody diarrhœa would further tend to throw doubt on the causal relationship. However, there was no other cause than the enema which could be found for this attack.

Hæmorrhage.—Considerable hæmorrhage from the bowels occurred in twenty-one out of 244 cases, or on a percentage of 8·7, which is above the general average. Thus, on Osler's 829 cases, the percentage was six per cent.

Of these twenty-one cases, no less than sixteen, or seventy-six per cent., were fatal, a very *striking mortality.* In Osler's cases of hæmorrhage only ten per cent.

* *A Civilian War Hospital* [The Portland]. Page 84.



TEMPERATURE CHART OF A CASE OF ENTERIC FEVER COMPLICATED BY FATAL APPENDICITIS.

were fatal. In some few cases, most, but not all, of which were fatal, there was a purpuric condition of the rose spots.

In some cases there was a scorbutic tendency, which showed itself by a spongy condition of the gums, and occasionally by purpuric spots. Such cases appeared to be benefited by lime or lemon juice.

Perforation of the intestines was curiously rare, and only occurred in one instance. Several cases of undoubted perforation of the intestine in enteric, however, occurred during the same period in the Volks Hospital under Dr. Thornton.

Appendicitis.—Several cases of appendicitis occurring in or about the fourth week of the fever were noted, and can be explained as due to secondary infections taking place in typhoid ulcers in the appendix. Such ulcers are by no means rare in fatal cases of enteric fever.

In some of the cases the signs of appendicitis were transient, and in only one were the results really severe. The following are the details of this case:—

Enteric Fever.—Appendicitis on the twentieth day. Abscess opened on thirty-fifth day. Death. Gangrenous appendix, suppuration in the right side of abdomen and right-sided empyema.

A Trooper, aged 20, not inoculated, was admitted with enteric fever of eight days' duration on July 5th, 1901; his illness ran a normal course until the nineteenth day of the disease, when the temperature fell to normal. On the evening of the next day he had acute abdominal pain. As seen by the light of later events, this was probably the onset of appendicular mischief. Vomiting and pain in the abdomen were present

for the next week. Four days after the onset of abdominal symptoms, right-sided pleurisy developed, and seven days after the onset of abdominal pain the pain was localised in the right iliac fossa. His condition got worse, but no signs of an abscess in the right iliac fossa could be made out, and there was no evidence of a pleural effusion. On the fifteenth day after the onset of appendicitis there was great pain in the right iliac fossa, and his condition was so grave that an exploratory operation under eucaine in the right iliac fossa was undertaken by Mr. Drew. An abscess, working its way into the abdominal wall, was opened, and found to extend into the pelvis and upwards along the ascending colon; it was shut off from the general cavity of the peritoneum by adhesions. The patient died the same day.

At the autopsy the appendix was gangrenous and perforated, and lay in an abscess cavity extending on the right side of the abdomen from the pelvis to the diaphragm; it was shut off from the general cavity of the peritoneum by adherent coils of intestines, while the falciform ligament of the liver limited the pus on the under surface of the diaphragm. There was a right-sided empyema, containing about two pints of purulent fluid, with collapse of the lower lobes of the lung. There were healing ulcers in the lowest part of the ileum. In this case surgical interference at an early date might have been successful. Appendicitis, with perforation, probably occurred on July 16th, and secondary infection of the right pleura on June 20th. On the other hand, physical signs establishing the existence of an abscess in the right iliac fossa were not detected, and the disease was thought to be one of protracted enteric fever.

Tape-worm.—A patient with a tape-worm had a mild attack of enteric, and during convalescence was successfully treated for removal of the worm. The tape-worm had evidently not been affected by the incidence of enteric fever in the body of its host. An old synonym for enteric fever was 'worm fever,' given on account of the fact that patients already the subject of round worms frequently evacuated them during the course of the fever. Murchison mentions that he had frequently seen both round and tape worms expelled during enteric fever (Murchison: *Continued Fevers*, p. 616, ed. iii.)

Phlebitis.—Phlebitis was perhaps the commonest sequela met with; it is to be regretted that actual statistics as to its occurrence are not available. It not infrequently occurred in both legs, one after the other, and sometimes gave rise to very great pain. The commonest situations were the deep veins of the leg and the femoral vein. In some instances relapses of the phlebitis took place. A not uncommon event during convalescence was to get œdema and increased firmness of the legs without pain or tenderness; this may possibly have been the result of thrombosis in the deep veins of the leg, but it certainly differed from the more evident and painful phlebitis usually seen at the termination of the fever or very early in convalescence.

It is noteworthy that pulmonary embolism was not seen in any case. This freedom from an event which might naturally have been expected, at any rate in a few of the numerous cases of phlebitis, shows that the clot is firmer and more closely adherent to the veins than in some other forms of thrombosis.

An explanation of the frequency of thrombosis may be some change in the

blood, due to the absence of fresh vegetables or the presence of some ingredient in tinned foods, and to the strain thrown on the veins of the leg as a result of fatigue consequent on prolonged trekking.

There have been two cases of gangrene of the leg during enteric fever, one due to embolism, the other presumably to arteritis. (See Surgical Report, p. 242.)

Neuritis, &c.—Signs of neuritis were seldom seen. The so-called 'Putty Paralysis' that has been described in patients suffering from enteric fever in South Africa, and referred to the pressure of the putties on the peroneal nerve was not observed.

In a few instances 'Tender Toes' were met with, but the tenderness in some, though certainly not in all, of the cases may have been due to peeling of the thickened epidermis from the feet.

In a man aged 31, signs of disseminated sclerosis developed after an attack of enteric fever, but gradually passed away before the patient left the hospital.

Epilepsy.—A man, aged 22, who stated that he had never had epilepsy previously, had a relapse of enteric ushered in by an epileptic fit. During convalescence he had two more epileptic fits which were accompanied by an epigastric aura.

Mental Changes.—After severe attacks, a certain degree of mental weakness was not uncommon; in the more marked instances the patient was silly and made mistakes, which showed he was not in touch with his environment. In other instances there was mental depression, or merely loss of will power, the patient making fresh plans and changing them from day to day.

Bronchitis, which is usually such a common accompaniment of enteric fever, was decidedly rare, probably this was due to the climatic conditions.

Pneumonia occurred during the fever in four cases, and was fatal in two.

Pleurisy, as a rule of slight degree, was not uncommon. It occurred more often on the right side, in one case it was double. In a case of perforation of the vermiform appendix about the twentieth day of enteric, with the formation of a large abscess on the right side of the abdomen, there was a large empyema on the right side. (See page 186).

Arthritic Sequelæ.—These fall under two heads:—

(1) Definite inflammatory changes in the joints, Arthritis.

(2) Pain without any objective changes in the joints, Arthralgia.

Arthritis was much rarer than Arthralgia. Occasionally during convalescence synovitis, which might have been other than typhoidal, was met with.

In one case there was acute arthritis of the left hip joint.

A man, aged 20, became ill with dysentery on May 1st, 1901, and said that he then passed blood. He had not previously had enteric fever, and had not been inoculated.

When admitted to this hospital on May 16th, the symptoms of dysentery had disappeared, and he was manifestly suffering from enteric fever. The temperature touched normal on June 20th, but was unstable for weeks afterwards. On June 29th, he had a rigor and a temperature of 105°, and on June 29th, there were signs of acute synovitis on the left hip joint which became immobile. On July 22nd, the thigh was put on an extension to prevent fixation in the flexed position.

Arthralgia.—During convalescence pains in the joints, without any objective signs such as swelling, creaking, or limitation of movement, were sometimes met with. It is possible that this arthralgia is an analogous condition to that met with during convalescence from scarlet fever, and may be due to a very slight secondary infection or to the circulation of toxins.

Myositis.—Myositis after enteric fever is very rarely described.

Osler* mentions a case of extreme tenderness of the calf muscles without any special swelling, as probably one of myositis. Possibly some cases of tender, painful, and swollen legs, without any palpable veins (see page 187), are due to myositis and not to thrombo-phlebitis of the deeper veins.

Localised Myositis.—

A Trooper, I.Y., was admitted into the hospital with tuberculous glands in the groin, and was successfully operated upon. Forty-three days after his admission to the hospital his temperature rose and he passed through an ordinary attack of enteric fever. During convalescence he developed localised myositis of the extensor brevis digitorum on the right foot; the muscle was swollen, tender, and stood out in relief. It yielded to rest and treatment with glycerine and belladonna.

Periostitis.—There was one marked example of periostitis with periosteal nodes on the right ulna of a man who had a relapse and parotitis. There were two cases of perichondritis of the costal cartilages, and one of the thyroid cartilage.

Parotitis.—There were three cases of non-suppurative parotitis, in one of these there was orchitis on the same side.

Orchitis and Epididymitis.—There were three cases of enteric fever in which the testes were inflamed. In one case the orchitis (left side) occurred in a convalescent patient shortly after parotitis, also on the left side. In the second case both testes were inflamed during the period of fever, but only for a short time—about a week.

In the other case, an officer, aged twenty-eight years, of a decidedly gouty history, acute epididymitis and orchitis occurred during the fever. Subsequently a small abscess in the epididymis burst through the skin of the scrotum. The urine was highly acid and contained pus and staphylococci. There had been no exposure to any venereal infection for three years.

* Osler: *Johns Hopkins Hospital Reports*, Vol. VIII, 1900, p 486.

Osler* in his recent analysis of 829 cases of typhoid fever in the Johns Hopkins Hospital from 1889–1899, records two cases of combined epididymitis and orchitis, which like the majority of the cases of this rare typhoidal phenomenon occurred in convalescence. Of Kinnicutt's† fifty-one cases thirty-five occurred in the convalescent period.

Hepatic Complications and Sequelæ.—In the 244 cases of enteric there was one case of jaundice, it was a mild form, probably of catarrhal origin. No cases of cholecystitis during the course of enteric fever were observed.

Solitary abscess of the liver as a result of enteric fever is so rare that it will be worth while to give brief details of such a sequela.

A man, aged 30, who had never had dysentery, had enteric fever for the second time within twelve years in South Africa in May, 1901. On July 3rd, when about to leave the hospital, he was attacked with acute lobar pneumonia on the right side with well-marked physical signs. On July 10th, there was an imperfect crisis. After this his temperature gradually assumed a hectic type and dulness remained in the right axilla, there was no displacement of the heart's apex, no downward enlargement of the liver, and no albumose in the urine. He was thought to have developed an empyema, and on July 29th, aspiration in the right axilla resulted in withdrawal of a pint of sanious pus. Bacteriologically, the pus was sterile, the cultures remained clear, no bacteria or amœbæ could be seen in film or fresh preparations. The trocar seemed to go through a tough membrane. On the following day Mr. Drew excised part of the seventh rib in the axilla and found that the abscess cavity was not in the pleural cavity but under the diaphragm in the right lobe of the liver near the anterior surface. The pus contained altered liver cells. The abscess was drained, and the patient recovered and started for England on September 4th, 1901, and was seen in good health on December 12th, 1901. (Compare p. 252.)

Multiple Subcutaneous Abscesses.—A man, aged twenty-three, had a severe attack of enteric fever, during which there was incontinence of urine. Probably as a result of this the skin became infected and ten subcutaneous abscesses developed; they were mostly about the buttocks, but there were three on the back and one in the right axilla. After being opened they rapidly healed. This patient had some mental weakness when he left the hospital on his way to England.

The Agglutination Reaction.—The agglutination reaction was employed in any case of doubt as a help to diagnosis, but not as a routine process.

Dysentery.

The total admissions for this disease were 475 and the deaths thirteen, giving a fatality of 2·75 per cent. Of the total (eighty-eight) deaths from all diseases 14·7 per cent. were from dysentery.

* Osler: *The Johns Hopkins Hospital Reports*, Vol. VIII., 1900, p. 469.

† Kinnicutt: *Trans. Assoc. American Physicians*, Vol. XVI., p. 145, 1901.

The monthly admissions and the deaths are shown on Charts G and H.

The largest number of admissions occurred in December 1900, but there was another rise in March, April, and May, 1901.

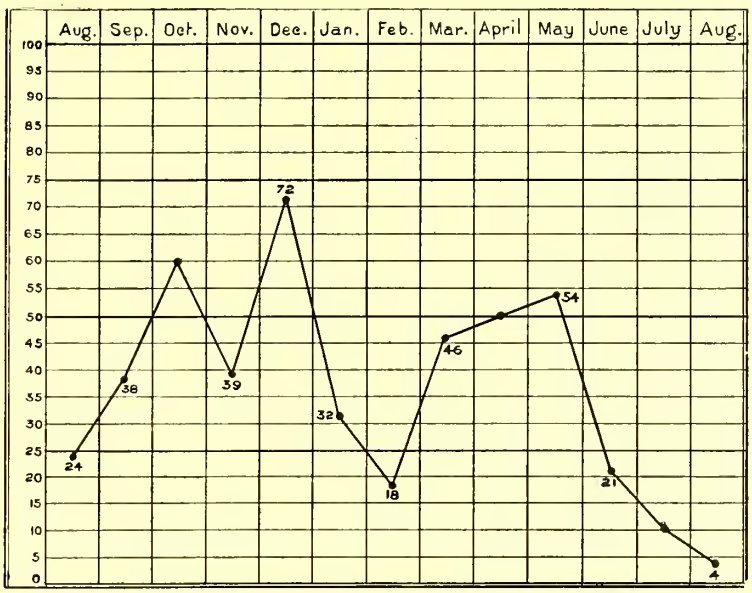


CHART 'G' SHOWS MONTHLY ADMISSIONS FOR DYSENTERY.

The *post-mortem* appearances of South African dysentery are as follows:—The large intestine is involved. In some cases the rectum, sigmoid, and cæcum are alone involved, and in all cases they are the parts most severely affected. In many cases the whole of the large intestine is affected, and sometimes in addition the last two or three feet of the small intestine. The walls of the intestine are enormously thickened, and in all the cases which we have seen the mucous membrane has also been ulcerated. The ulcers may be small with clean-cut edges, or larger with ragged edges, and the floor consisting of slough. Histologically the earliest stage appears to be in the columnar cells lining Lieberkühn's crypts in the colon, which are seen to be breaking up and discharging much mucus. (*Vide* Fig. 1.) Then follows small cell infiltration and œdema of the connective tissue around the vessels between the mucous crypts. The inflammatory change spreads, probably by the lymphatics, to the submucosa, which becomes swollen from dilatation of the blood-vessels, œdema, and small cell infiltration. (*Vide* Fig. 2.) As this increases the mucous membrane either ulcerates (*vide* Fig. 3) or undergoes necrosis and sloughs off, exposing the greatly swollen submucosa, which somewhat resembles the granu-

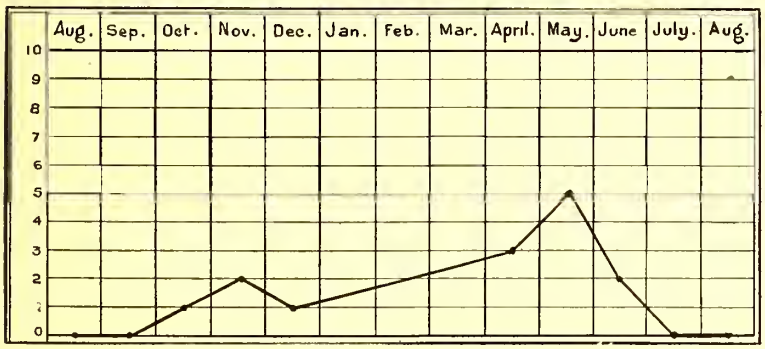


CHART 'H' SHOWS MONTHLY DEATHS FROM DYSENTERY.

lation tissue seen in the case of an ordinary ulcer. The vessels in the submucosa may become thrombosed. The same necrotic process seen in the mucosa may attack the submucosa, and later the inflamatory process may extend right through the muscular tissue into the serous covering or even into fat around the colon. In some instances the muscular layer stains badly, and is broken up, appearances showing necrotic processes. When, after recovery from an acute attack, death subsequently occurs, the submucous layer is seen to be fibrotic from organization of inflammatory products.

We believe that South African dysentery is infective, and that its prevalence

FIG. 1.

FIG. 2.

FIG. 1.—Catarrhal changes in the mucous cells of Lieberkühn's crypts with outpouring of mucus, which is seen as an adherent mass on the surface. Small cell infiltration between the crypts of Lieberkühn. Submucosa practically unaffected.

FIG. 2.—Small cell infiltration has extended into the submucous coat. The epithelium of Lieberkühn's crypts is much degenerated.

is due to insanitary conditions. With regard to the pathology of the disease, we can only say that we are sure it is not due to amœbæ, for we have always failed to discover them in the evacuations.

Clinical Features.—We may roughly divide the diseases into two types: in the first type, the one which is most common, in addition to the passage of blood and slime there is fever lasting about six days; with the subsistence of the fever the motions gradually assume their natural character, and the patient recovers. This is the usual course of the disease. Death, however, may ensue during the febrile stage, or it may occur some days after the fever has subsided: in other

cases, diarrhœa may continue after the fever has subsided, and the disease may become chronic. In the second type of dysentery, the temperature does not fall at the end of six days, but it continues for two or three weeks longer. During this latter period blood and slime disappear from the motions, which become liquid, and sometimes are much more like those of enteric fever than dysentery. In these cases the spleen not infrequently becomes enlarged, still further increasing the resemblance to enteric fever. In some cases neither blood nor slime is passed during the whole course of the disease, and the intestinal symptoms are quite in the background. In fact, in some cases there has been constipation during several days of the attack. We believe that in this type of dysentery there is a secondary infection, and the disease resembles the septic type of scarlet fever.

An interesting point sometimes arises in connection with diagnosis. During recovery from dysentery it is not uncommon to get an accumulation of fæcal matter in the intestines. On the other hand, chronic constipation—due, no doubt, to the nature of the food—is common in South Africa, and in some of these cases an accumulation of fæces gives rise to dysenteric symptoms—tenesmus and the passage of mucus and blood. Such cases can be distinguished from true dysentery by careful inquiry into the history, although it must be admitted that diagnosis is sometimes difficult. In both cases the treatment is the same—the careful administration of enemata and purgatives.

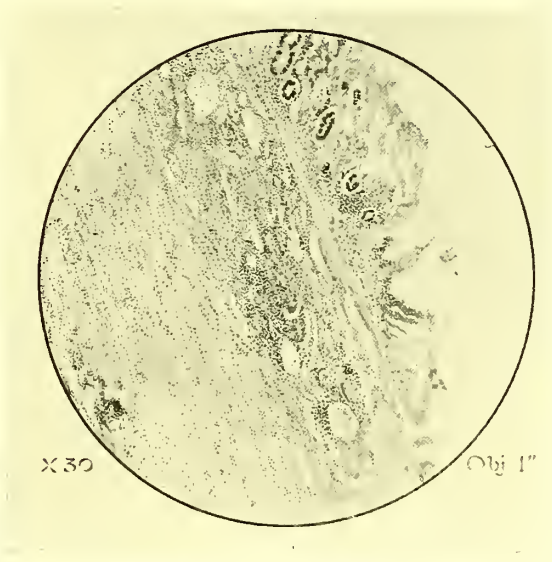


FIG. 3.

FIG. 3.—Shows the margin of an ulcer. The mucous membrane is partly necrosed. The sub-mucosa is inflamed and shows dilated vessels.

When an acute attack supervenes in chronic dysentery, the prognosis is much worse than in a primary attack.

In one of the fatal cases there was hæmatemesis; at the post-mortem examination there was no ulceration of the stomach, but the duodenum was inflamed, and showed submucous extravasations of the blood. In a case seen in consultation with Surgeon-Captain Anderson, R.A.M.C., at No. 2 Model Schools, Pretoria, in May 1901, there was a profuse hæmatemesis and melæna. At the autopsy there was very acute dysenteric ulceration of the colon, and a large recent ulcer in the stomach near the pylorus. The gastric ulcer was much the same in appearance as the ulceration in the colon.

Complications.—There were only three cases in which there was hepatic complications. In two out of the three there were multiple hepatic abscesses without pylephlebitis. In a third case, a single hepatic abscess followed, and was possibly due to an operation for piles, the dysentery having occurred six months previously (*vide* p. 234). From inquiry among medical officers it appears that when hepatic suppuration follows South African dysentery the abscesses are multiple and not single.

Arthralgia.—Pain in the joints, arthralgia, without any evidence of synovitis, was occasionally seen during convalescence from dysentery; similar phenomena occurring after longer intervals from an attack of dysentery are possibly independent of toxic absorption from the colon, and may have been merely examples of rheumatism.

Arthritis.—In some cases there was definite evidence of synovitis, but suppuration did not result in any case in this hospital.

Treatment.—

1. A number of different methods of treatment were adopted. The most generally used and successful routine treatment was the administration of magnesium sulphate in drachm doses every hour for twenty-four hours, the patient being kept on milk, subsequently followed in some cases by bismuth and morphia.

2. Ipecacuanha had a fair trial and was by no means without success.

3. During the last two and a half months that the hospital was open the cases of dysentery were collected into a special ward, and placed under the care of Dr. G. E. Richmond, whose report on a special method of treatment, viz. by sulphur, is attached (*vide* p. 209).

4. Rectal irrigations of nitrate of silver, 20 grs. to the pint, or of boracic acid were employed, more especially in chronic cases, with some success.

5. For chronic cases salol was employed with some success. (For further particulars reference may be made to the Report of the Deelfontein Hospital, p. 23.)

Diarrhœa.

There were 165 admissions for diarrhœa, Chart I shows the monthly admissions. The admissions by no means represent the prevalence of this affection, as the majority of cases were not sufficiently severe for admission. Almost everybody, on or soon after arrival in South Africa, suffers from diarrhœa, and many have several attacks. On looking through the case books of the out-patient department, we find that of 300 cases taken consecutively, 162 were cases of diarrhœa.

The disease is commoner in the summer months. Exposure to cold is a factor of importance in causing an attack of diarrhœa, and presumably acts by reducing the resistance of the alimentary canal. The wearing a cholera belt appears to be

a prophylactic. This disease appears to be allied to the summer diarrhœa which occurs in England. From the incidence of the disease at times when dysentery is absent, we feel satisfied that it has no etiological relationship with this latter affection. The principal symptom is diarrhœa, which is sometimes accompanied by vomiting. The temperature may be raised for a short period, but there is usually no fever. The motions are liquid, and very occasionally contain a small quantity of blood and slime. The symptoms pass off as a rule in a few days, but the diarrhœa may continue for some weeks without otherwise affecting the health of the patient. The most satisfactory treatment is starvation, rest in bed, and removal of the irritating contents of the bowel by castor oil, guarded by a little opium, while salol for some little time after the more acute symptoms have passed off is a useful remedy. After one or more attacks a certain degree of immunity is established.

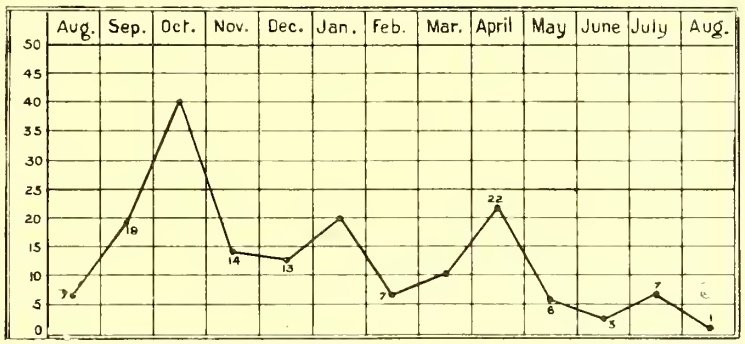


CHART 'I' SHOWS MONTHLY ADMISSION FOR DIARRHŒA.

JAUNDICE.

There were 116 cases of jaundice admitted. Chart K shows the monthly admissions, from which it will be seen that the majority of cases occurred during January, February, and March; 61·2 of the cases being admitted during these months.

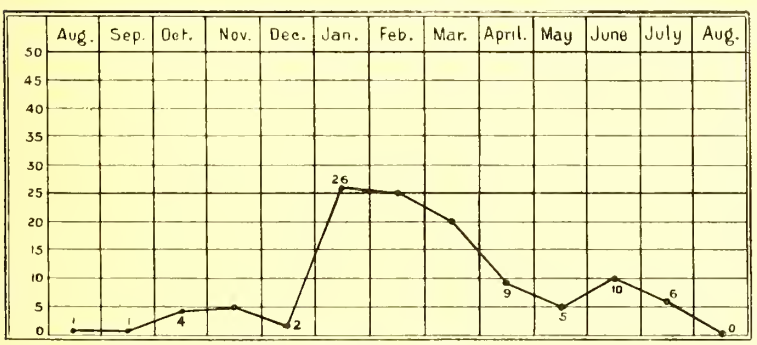


CHART 'K' SHOWS MONTHLY ADMISSIONS FOR JAUNDICE.

The disease runs a definite clinical course. The patient complains of nausea and of great aversion to food and smoking; the nausea may be accompanied by vomiting or by pain which is situated over the right of the epigastric area, but it is not definitely localised. The patient feels exceeding wretched and depressed. In some cases there is a moderate pyrexia, while in other cases the temperature

remains normal throughout. The tongue is covered with white fur and the bowels may be regular or there may be slight diarrhœa or constipation. The pulse is slowed.

After these symptoms have continued for three or four days jaundice appears. The jaundice is usually intense and the motions become clay-coloured. With its appearance the other symptoms as a rule subside, although they may continue for a day or two longer. The jaundice continues for a few days and then disappears.

As recovery invariably ensues one can only surmise as to the pathology of this affection. The nausea, vomiting, and abdominal pain suggest an inflammation of the duodenum, which leads to a blocking of the orifice of the common bile-duct and thus causes jaundice. According to this view the jaundice is a more or less accidental sequela, and this is supported by the fact that in a number of cases there are similar initial symptoms but no subsequent jaundice.

As to the causation of this affection, its occurrence in epidemic form might be held to point to some infective agency. There was no enlargement of the liver or spleen, no albuminuria, and no relapses. It therefore resembles a benign form of infectious jaundice, and is not Weil's disease or the infectious relapsing jaundice described by French writers as substantially the same as Weil's disease.

The epidemic character of the jaundice is probably associated with the greater incidence of enteritis and diarrhœa during the hot season. In other words the jaundice is epidemic because gastro-duodenal and other forms of intestinal catarrh are so, and not from any specific infection falling primarily on the biliary apparatus. The epidemic in South Africa may perhaps be compared with smaller epidemics of jaundice in England, that have been known to follow influenza, the latter may be regarded as an epiphenomenon of the gastro-intestinal form of influenza.

During the epidemic in January, February, and March, 1901, jaundice was stated to be prevalent among horses in Pretoria.

The occurrence of urticaria in jaundice gives rise to a curious appearance, the area of the serous exudation is stained of a brightish yellow colour, and as a result the urticarial patches are more jaundiced than the rest of the skin. The edges only are red, the appearance is striking, and in some degree resembles erythema nodosum. It is, however, a rare complication.

A Volunteer Captain, aged 24, had had slight diarrhœa and malaise for a month shortly after anti-typhoid inoculation. Three days before admission he felt ill, had nausea and the next day was jaundiced. On admission there was slight jaundice, but no itching of the skin. After being in bed for six hours there was marked itching of the skin; the next day he had jaundiced urticarial patches over the arms, legs, and abdomen. These areas rapidly faded.

Stomatitis.

A small number of cases of membranous stomatitis occurred, and in June, 1901, there were several cases admitted in the same week. In some there was a membrane on the tonsils which gave rise to a suspicion of diphtheria. This, however, was negatived by bacteriological examination.

In two instances there was considerable, though transient, fever at the commencement of the attack without any other cause.

The occurrence of stomatitis was very probably disposed to by a slightly scorbutic condition of the mouth.

Tonsillitis.

There were 120 cases admitted as tonsillitis. The monthly admissions are shown on Chart P, the largest admissions were in April and July. There

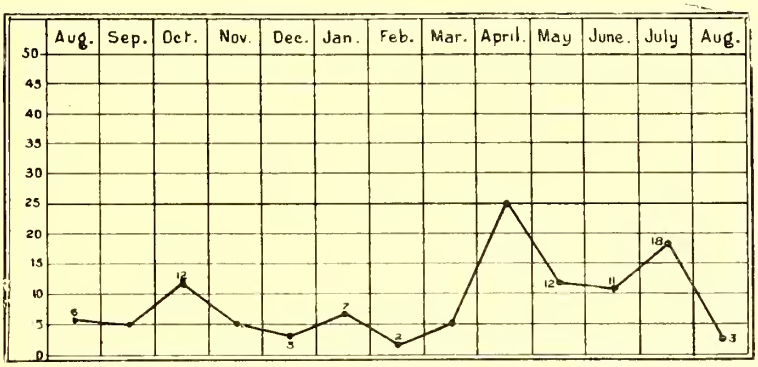


CHART 'P,' SHOWING MONTHLY ADMISSIONS FOR TONSILLITIS.

was no correspondence between the admissions for tonsillitis and those for rheumatism (Chart J).

During the month of June, July, and August, 1901, there was an epidemic of sore throats in part of the medical section; it appeared probable that it spread from patient to patient as the result of carelessness on their part in drinking out of the same cups, using the same spoons, &c., without washing. Some of the cases of sore throat that arose in the hospital had the clinical aspect of diphtheria, but bacteriological examination showed they were staphylococcal or streptococcal.

Dyspepsia and Gastritis.

There were seventy-eight admissions under these headings.

The most prolific cause of these conditions was undoubtedly dental caries which prevented the food, especially the ration biscuit, from being properly

masticated. The Army biscuit is a prolific cause of fracture of any carious teeth and of artificial teeth and plates. Another cause of the wide-spread dental trouble is the scorbutic tendency not uncommonly seen in men who have been on 'trek' for a considerable time; while the unavoidable abstinence from the use of the tooth-brush when on column, and the resulting accumulation of the debris of biscuit and other forms of food around the teeth must be reckoned as causal factors in the production of caries.

Whether, as has been suggested, there is some inherent factor in the climate of South Africa, such as the character of the water, that disposes to dental caries is a question on which a dogmatic statement need not be attempted here. But it is well to bear in mind that the Kaffirs as a rule have excellent teeth. As would naturally be expected dental caries is much more frequent and severe at the present time (September 1901) than earlier in the campaign.

Long-continued dyspepsia due to deficient teeth leads to very considerable debility and is a frequent and genuine cause for invaliding. As long as the patient can obtain suitable food, he may improve, but directly he is unable to get minced or farinaceous diet a relapse will result. Men in this condition are often utilised as orderlies in hospitals, and thus serve their country to good purpose although not in the field. From their habits of obedience, punctuality, and cleanliness, such men often do better work than professional orderlies.

Rheumatic Fever.

Has been exceptionally rare, only four cases having been admitted, while two others were transferred from other hospitals. It occurred chiefly, though not entirely, in patients who have had previous attacks.

Example.—A man, aged 32, who had never had rheumatic fever or any other rheumatic manifestations, was admitted with a history of joint pains of eight days' duration. His temperature was 101°, and the heart sounds were short and suggested commencing pericarditis. Under treatment he rapidly improved, but was left with well-marked mitral regurgitation, for which he was invalided home.

Rheumatism.

There were 369 admissions for this affection. Chart J shows the monthly admissions, from which it will be seen that the majority of cases occurred during the months July to December inclusive, and that only comparatively few cases were admitted during the months January to April.

Under this heading of rheumatism are included a number of affections.

(1) A subacute form, like the preceding, amenable to treatment by salicylates,

(2) Fascial and muscular rheumatism not yielding satisfactorily to salicylates.

(3) Osteo-arthritis.

The commoner form of rheumatism was a subacute or more often chronic muscular or fascial rheumatism without joint affections, the lumbar muscles and faseiæ being specially affected. This sub-acute rheumatism is probably of a different nature from acute rheumatism, since it reacted very unsatisfactorily to salicylates, and did not tend to affect the heart. Pain was sometimes referred to the joints, but swelling and redness were wanting, and in many eases it was difficult to decide whether the pain was genuine or not. Allied, if not praetically the same, conditions were the manifestations of lumbago and seiatica seen in some men after exposure to cold and damp. In some cases it was

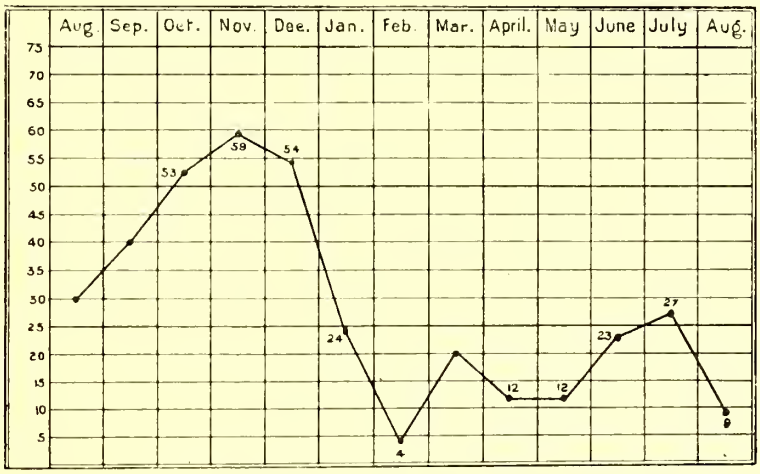


CHART 'J' SHOWS MONTHLY ADMISSIONS FOR RHEUMATISM.

difficult or impossible to separate chronic forms of true rheumatism, viz., those relieved by salicylates, from the fascial or myalgic affection.

In one case of subacute muscular rheumatism in a man, aged 27, who had never presented any manifestations of rheumatism before the last two months, there were copious crops of subcutaneous nodules on both shins and olecrana. These persisted for the six weeks during which he was under observation before being invalided home, without any real improvement resulting from salicylate treatment. It is noticeable that there was no evidence of any cardiac lesion.

In the following case there seemed to be a combination of rheumatism with scurvy:—

A man, aged 32, who had never had rheumatic fever, suffered from pain and swelling of the knees, ankles, elbows, wrists, and fingers. Eight days later the mouth was noticed to be sore and the teeth loose, and on the following day purpuric patches appeared over the extremities. The rheumatic and scorbutic symptoms improved on salicylates and plenty

of vegetables, but from time to time the arthritic pains and purpuric eruption recurred. Some seven weeks after the onset, well-marked rheumatic nodules appeared on the arms.

Osteo-arthritis.

There were very few admissions with this disease. Some of the cases appear under the official heading of rheumatism. The cases developed after exposure on the veldt.

In a Lieutenant, aged 24, the disease made very rapid strides within two months of the onset. He was invalided home in a crippled condition, but rapidly improved on the voyage, and when seen in November, 1901, was practically well.

Organic Heart Disease.

There were forty-nine admissions for valvular disease of the heart. These cases of valvular disease of the heart naturally fall into two groups:—(*a*) Acquired in South Africa; (*b*) Old standing heart disease. There were few examples of organic heart disease acquired in South Africa, as acute rheumatism was extremely rare. In two cases thoracic aneurysm developed during the campaign. Old standing heart disease was met with in soldiers who had probably gradually developed the disease without any urgent symptoms, and in whom the compensation had broken down under excessive strain.

Well-marked heart disease was present in a number of yeomen who had recently arrived in the country, and must have been in evidence at the time that their medical examination should have taken place.

Disordered Action of the Heart.

There were forty-eight admissions under this heading. It occurs in young, especially in still growing, soldiers, and is the result of excessive fatigue involved in forced marches. The pulse was rapid, about 120, and apex beat hardly displaced but forcible and somewhat diffused, and the sounds somewhat short. Œdema of the feet was rarely seen, and there were no signs of backward pressure.

Malaria.

There have been 394 admissions for this disease. Chart L shows the monthly admissions. November, December, and March were the months in which the largest number of admissions occurred. The cases came chiefly from the bush-veldt north of Pretoria, the Magaliesberg valley, the Rustenburg district, and

the low country near Delagoa Bay and east of Waterval Boven. The admissions for this disease are consequently very dependent upon the movement of the troops.

It is quite possible that many cases diagnosed as malaria did not belong to that disease, for many were admitted here after the fever had subsided, and the diagnosis was made upon the history and the provisional diagnosis made up country. (*Vide* S.C.F.)

We have found the malarial parasite in a number of cases, but in other cases of undoubted malaria we have failed. In all these latter cases quinine had

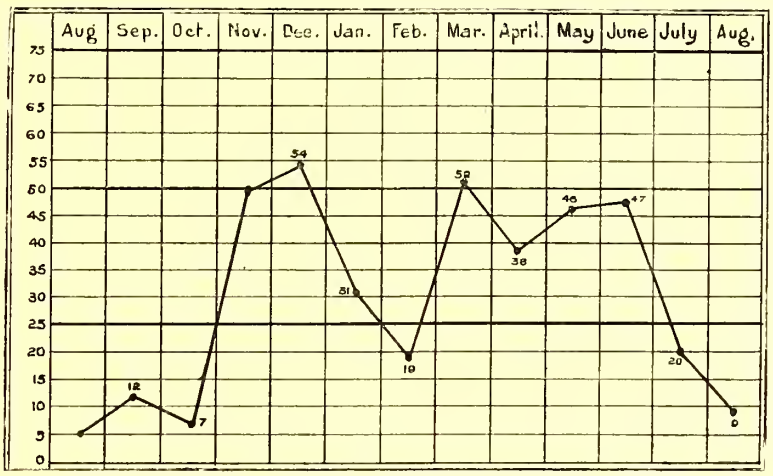


CHART 'L' SHOWS MONTHLY ADMISSIONS FOR MALARIA.

been administered, and was the probable cause of the failure of the blood examination.

Undetermined Fever. Simple Continued Fever.

Simple continued fever is a term much used in the Army Medical Returns, covering in all probability several different and specific diseases. It serves chiefly as a non-committal or provisional diagnosis. It is, however, a diagnosis that the civil surgeon rather shrinks from, and seeks to avoid by labelling the cases influenza, abortive or probable enteric, or irregular forms of malaria. As a term, simple continued fever should be used to designate a fever of undetermined nature and not a specific morbid entity; still, it must be admitted that it is a very convenient provisional diagnosis. Abortive enteric, and some cases of influenza, malaria, &c., may never develop sufficiently characteristic symptoms to enable a definite diagnosis to be made. Such cases are conveniently placed under the heading of simple continued fever. It has been suggested that some cases of

simple continued fever are really examples of exhaustion fever, while others are due to intestinal sepsis.*

With all these different conditions, which may be ticketed as simple continued fever, there has arisen a natural desire to stop such a vague, if charitable term. It is, however, well to bear in mind the probability that there may be several specific fevers in South Africa which have not yet been differentiated.

There were 200 cases diagnosed as simple continued fever, the cases being more numerous during the summer months. (*Vide* Chart M.) It is possible that some of the cases diagnosed as influenza and malaria might have come under this category. A more or less definite entity is a fever lasting a week or ten days, the temperature rising up to above 100° degrees in the evening and falling

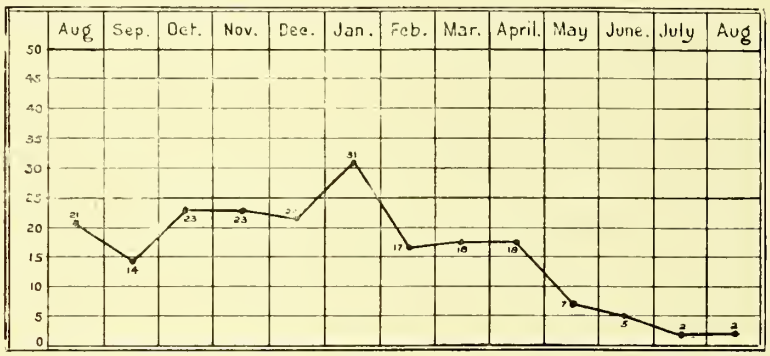


CHART 'M,' SHOWING MONTHLY ADMISSIONS FOR SIMPLE CONTINUED FEVER.

to normal in the morning, loss of appetite and general malaise being the only symptoms.

The following case is one which might be designated simple continued fever. There was some evidence of its being malaria and some of its being abortive enteric fever, but the symptoms were not sufficiently definite to justify a definite diagnosis.

A Trooper, I. Y., aged 21, was admitted for the effects of a contused back on July 20th, 1901. On July 26th his temperature rose to 100·4°, and continued to do so at night until August 1st. During this time he was taking quinine, 10 grs. daily. On August 9th the temperature again rose, and he was treated for influenza with salicin. On August 11th he was given quinine, 15 grs., and the temperature became normal next morning. After this, owing to a misunderstanding, no more quinine was given, and the temperature remained raised until August 21st. On August 20th, quinine in 5-grain doses was given three times a day, and on the following day the temperature came down and remained below normal. On August 25th Widal test for enteric showed a positive reaction, 1 in 20 dilution in 10 minutes. The patient had not previously had enteric fever, and had not been inoculated. No malarial parasites were seen in the blood, but the blood was not examined before quinine was given.

* Tooth, in *A Civilian War Hospital* (The Portland), p. 108.

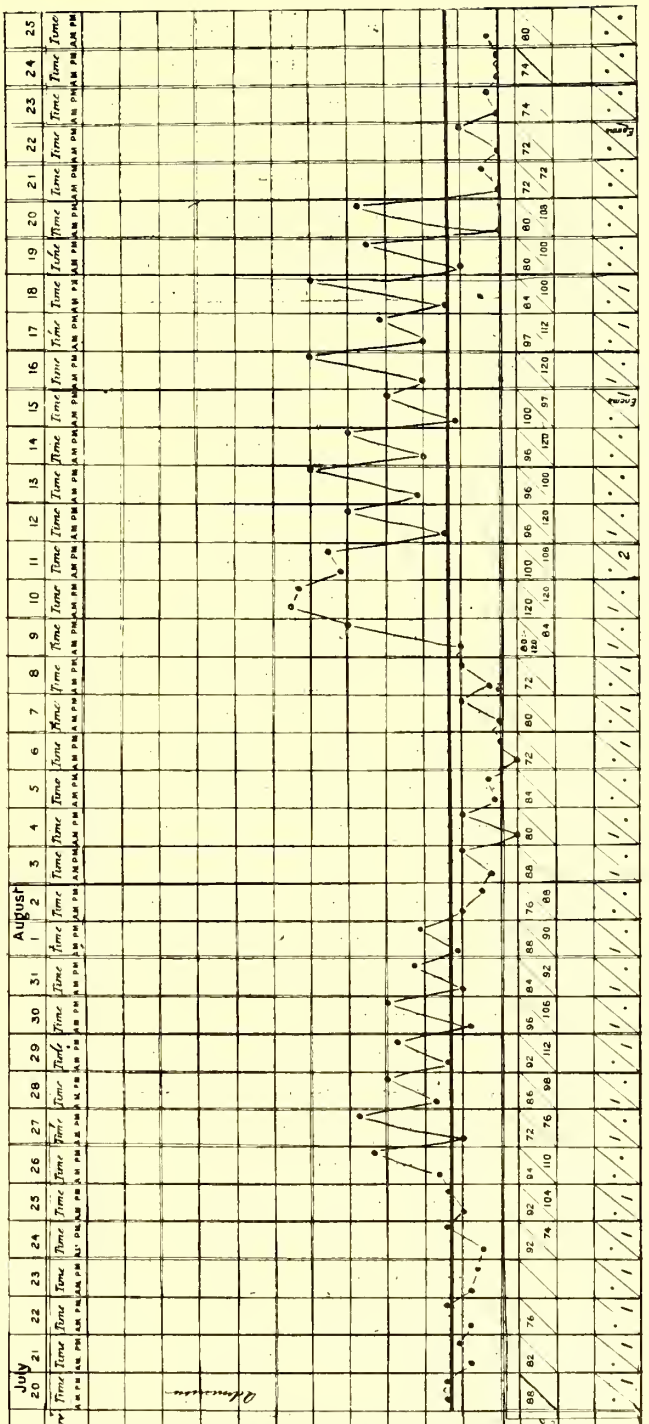
Malta Fever.

In addition to the forms of fever grouped under simple continued fever in the previous category, there are severe and prolonged cases of pyrexia, bearing some resemblance to enteric fever or to generalised tuberculosis, but which are certainly not either of these two diseases. The following are short note of one of these cases :—

Case I.—A civil medical Officer, aged 28, was admitted into the Yeomanry Hospital at Pretoria, on October 5th, 1900.

History.—He arrived at Cape Town in July, was at Deelfontein for a few weeks, and had since been in Pretoria. He had not been abroad before. He had never had enteric fever, and had not been inoculated. He suffered from diarrhœa shortly after arriving in South Africa, and the motions have been liquid or pultaceous ever since.

Early Symptoms.—For a week before admission he was laid up with malaise and pyrexia, the temperature rising to 101° or 102° in the evening, and falling to normal in the morning. On admission (Oct. 5th) there were no physical signs, but he complained of pain in the back of the neck, which lasted for a few days and then disappeared. On October 18th, the spleen could be felt just below the costal margin, and the tongue was slightly dry and brown. On Oct. 24th, the spleen was a trifle larger; the tongue was now moist but still brown.



TEMPERATURE CHART OF A CASE RESEMBLING SIMPLE CONTINUED FEVER.

Examination of Blood.—On October 27th the blood was examined by Dr. Dodgson. It agglutinated the Malta fever coccus in dilution of 1 to 80, but gave no reaction with the typhoid bacillus.

Progress.—Up to this period the patient had not felt ill, and with the exception of slight enlargement of the spleen, there was no physical sign. The temperature had run an irregular course, being normal during part of each day, but always being raised to 101° or 102° some time or other in the day. On the morning of October 28th, the temperature was normal, but from that time it gradually rose and reached 104° on the evening of October 31st. From October 29th until November 9th, there was a continuous pyrexia, the temperature varying between 100° and 103°. On November 10th the temperature was normal, and continued so, with the exception of a rise to 103° on November 11th, and slighter rises on November 13th, 14th, and 17th. During the period between October 28th and November 10th, the patient felt ill and became emaciated, and his condition gave rise to anxiety. There was no definite physical sign, with the exception of gradual enlargement of the spleen. This organ, on November 11th, could be felt nearly three inches below the costal margin, and was decidedly hard.

Second Examination of the Blood.—The blood was examined by Dr. Dodgson on November 11th, when it agglutinated the Malta fever coccus in dilution of 1 to 60, but gave no reaction with the typhoid bacillus.

Recovery.—After November 11th the spleen rapidly diminished in size, and in a few days no enlargement could be made out. The patient gradually improved, and he was discharged on December 11th from the hospital, whence he proceeded to Cape Town. After a few weeks he had quite returned to his normal state of health. During the illness the abdomen was never distended, and there were no typical enteric spots. The motions were sometimes liquid, and sometimes pultaceous, and were never typical of enteric fever.

Treatment.—He was treated with quinine, sodium salicylate, salol, arsenic, potassium iodide, and other drugs, without appreciable effect.

We feel sure, from clinical observation, that this patient was not the subject of enteric fever, and this is supported by the negative result with the agglutination test. Towards the end of the pyrexial period, the question of generalised tuberculosis was raised, and the hard, enlarged spleen was in favour of such a diagnosis. The complete recovery which ensued put generalised tuberculosis, however, out of court.

The only absolutely certain means of determining Malta fever is to obtain the cocci from the spleen; but in lieu of this we have the positive test of the agglutination of the cocci by the blood. We do not know how far this test is reliable, and consequently we do not know how much value to place upon it.

In another case the patient suffered from prolonged fever for several months, the spleen became enlarged and hard, and the blood gave a negative result both with Malta fever and with the typhoid bacillus. After the fever had subsided there was marked swelling in several of the joints. The patient suffered severely from cerebral symptoms, and left the hospital insane. This case also appeared to be one of Malta fever.

PRETORIA—MEDICAL DIVISION.

Influenza.

There have been 111 cases of influenza admitted into the hospital: the monthly admissions were shown on Chart N. In May, 1901, there was a small epidemic among the nursing sisters, which is not included in the Chart.

There were no special features about the cases of influenza, which conformed

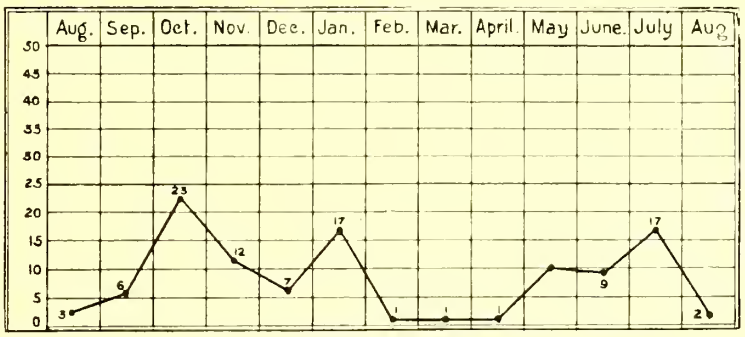


CHART 'N,' SHOWING MONTHLY ADMISSIONS FOR INFLUENZA.

to the mild forms seen in England. The only point of interest is the differentiation of influenza from the vague class of undetermined fever officially recognised as simple continued fever.

Pulmonary Diseases.

Bronchitis.—There were sixty-one cases admitted under this heading. The monthly admissions were practically uniform. In some instances the patients had suffered from it before, or were the subjects of emphysema. The irritation of the dust was probably a factor of importance in the production of the disease.

Laryngitis and tracheitis were not very rare, and in some instances were probably due to the irritation set up by dust inhaled by mouth breathers.

Pneumonia.—There were seventeen admissions for pneumonia, with only two deaths; but in addition there were four cases of enteric fever complicated by pneumonia, of which two proved fatal.

In one case of early double pneumonia, oxygen was given with an apparently successful result, the temperature becoming normal on the sixth day of the disease. The details of the case were fully reported by Dr. Richmond in the *Lancet* (Sept. 28th, 1901, Vol. II., page 840).

Pulmonary Tuberculosis.

There were seventeen admissions for pulmonary tuberculosis. In nearly all the cases there was reason to believe that the disease had been acquired before

the patient came to South Africa, and even in the few cases where there was no history pointing to a former attack, it is impossible to negative the hypothesis that the outbreak was a recrudescence of latent tuberculosis infection.

Apart from dust, the South African climate appears an ideal one for the treatment of tuberculosis; nevertheless, it must be remembered that tuberculosis is a common disease among the Kaffirs.

Traumatic Hæmothorax, due to gunshot wounds of the chest, were of course treated in the surgical wards, and are described in that report.

Still, as we have, through the courtesy of our colleagues, had the opportunity of seeing some of these cases, a few remarks may not be out of place.

The presence of aseptic blood in the pleural cavity may be accompanied by a febrile temperature, which in itself is somewhat suggestive of septic infection. Possibly the febrile disturbance is due to the absorption of fibrin ferment, though the length of time the temperature may remain raised without any other manifest cause than hæmothorax, makes it difficult to accept this view. The length of time that the blood may remain perfectly fluid is remarkable.

A difficult question that it has fallen to our lot to discuss is, whether or not to aspirate the chest. In the absence of dyspnœa and displacement of the heart it is usually wiser not to interfere; nevertheless, in some cases, aspiration is ultimately required (*vide* p. 251).

Spasmodic Asthma.

Two cases of this rare disease have been observed. The cases did not do well at the hospital, the elevation of which is 4000 feet above the sea level.

In one case where asthma only developed in this country, it seemed possible that its onset was due to trekking undertaken within a very short time after enteric fever and before sufficient rest had been taken.

Heat-stroke.

There has not been a single well-marked case of heat-stroke. Patients have been admitted with nervous conditions attributed to the effects of the sun, but it is doubtful whether this was the real cause. (*Vide* also Appendix II. by Dr. Langdon Brown, p. 213.)

Raynaud's Disease.

Well-marked local syncope and local asphyxia developed in a lieutenant, aged twenty-six, who had previously had two attacks of dysentery, and had recently been exposed to cold in the trek. He had never had hæmoglobinuria, and had not been specially subject to chilblains.

Debility.

There were 399 cases admitted as debility. Under this heading a large number of cases have been admitted into the hospital. Further analysis would probably result in a number of the cases being transferred to other headings; thus, some cases of debility merge into the milder forms of neurasthenia, others are convalescent from various forms of fever, while a considerable number depend on improper feeding and deficient teeth.

In some instances debility is the charitable title applied to men who are suspected, but not indubitably convicted, of malingering.

Still, there remains a considerable residue of patients worn out by long-continued hard work who are pulled down and only required rest, quiet, and good food to make them fit for their duty.

Functional Diseases.

Neurasthenia. — While bearing in mind the comparative frequency of malingering and intentional exaggeration of trivial pain, there is no doubt that the long-continued strain and anxiety incident to active service had a very wide-spread effect, especially on officers in positions of responsibility and trust.

In minor instances this resulted in loss of power in coming to a decision, in failure of memory, the so-called South African memory, and in marked inertia, while in other and more severe cases mental depression, insomnia, and neurasthenia developed.

The want of will power, or the inertia due to prolonged strain, are shown in some degree by the willingness with which officers, usually energetic and vigorous, would consent to remain in bed for trivial ailments.

Loss of memory and some degree of mental confusion can be clearly traced to overwork, strain, and the anxiety. In some cases no doubt the consciousness of failing mental ability lead to a mistaken attempt at compensation by alcoholic stimulation, and so to complete break-down.

Hysteria.

Well-marked hysteria was very rare. In one case of functional aphonia in a man aged twenty-four there had been a previous attack four years ago; but here there was no very definite exciting cause for the attack, such as prolonged service.

Malingering.

There was undoubtedly a great deal of malingering among the admissions to the hospital, and it is to be regretted that the new Yeomanry (drafts April, 1901) furnished a large number of these patients.

The usual complaints made by soldiers anxious to avoid service were pains in the head, back, and limbs, while deafness, heart disease, without any physical signs or modified action, were also sometimes described.

The question whether a given case of pain in the back or other part of the body is entirely malingering, genuine, or an intentional exaggeration of slight rheumatic pain, is a difficult one to decide. In some instances it was almost impossible to exclude the existence of some underlying rheumatic myalgia. Cases suspected of malingering were kept in bed for a time on milk diet, and given a tonic to improve their appetite; on this line of treatment a large proportion improved.

Renal Disease.

Acute nephritis has occasionally been seen to develop as the result of exposure to cold and wet on the trek, but it is remarkable how comparatively rare this disease has been, considering the amount of exposure troops have been subjected to. Cases of arteriosclerosis of old standing were observed.

APPENDIX ON SULPHUR IN THE TREATMENT OF DYSENTERY.*

By Dr. G. E. RICHMOND.

During an experience of the treatment of Dysentery at the Imperial Yeomanry Hospital, at Deelfontein,† I originally came to the conclusion that, of a multitude of remedies recommended as a cure for this most rebellious complaint, ipecacuanha guarded by opium, combined with warmth and rest in bed, was the best. But in some cases, even when treated in this way, the patients derived very little benefit, and ultimately died.

For example:—One case at Deelfontein admitted as a convalescent from enteric developed dysentery three or four days after admission, and although given large doses of ipecacuanha (3ss—3j) every four hours on two different days, his dysentery continued, and falling into a typhoid condition with muttering delirium, constant diarrhœa, and painful tenesmus, he died on the fourth day of the disease.

Such a striking example of the failure of ipecacuanha naturally made one speculate on other possible remedies.

The use of sulphur in dysentery was suggested on the analogy of the treatment of anthrax by sulphur, as advocated by Mr. Arbuthnot Lane. Ipecacuanha was formerly employed locally in the treatment of anthrax, and it seemed natural to suppose that if sulphur were a more successful germicide in the case of anthrax, it might probably be a correspondingly more successful treatment in dysentery. The results have justified these expectations, for in every case treated with sulphur a cure has resulted, and there seems little or no tendency for relapses or chronic conditions of alternating diarrhœa and constipation to occur. To the patients themselves it is a great boon, as the obstinate vomiting caused by ipecacuanha is entirely absent, nor is it at all necessary to starve them when taking sulphur as in the case of ipecacuanha. Every patient is ordered farinaceous diet from the first; it is of the utmost importance that meat of all kinds should be most rigorously excluded from the diet until the diarrhœa has ceased for a week.

Twenty grains of sublimed sulphur, combined with five grains of Dover's powder, are ordered every four hours, and from the administration of the first powder the general condition of the patient becomes much more comfortable; the diarrhœa, the distressing tenesmus and griping pains are greatly relieved at once,

* This report appeared in the *Lancet*, 1901, Vol. II., p. 1408.

† *Vide Lancet*, 1901, Vol. I., p. 1676, Article 'Sulphur in Treatment of Dysentery.'

whilst the passage of blood and mucus is as a rule stopped in two days, whereas, when treated with mag. sulph. or ipecac, a patient seldom owns to any amelioration of his condition until twenty-four hours from the commencement of the treatment.

The detailed notes of the cases treated with sulphur at Deelfontein are not now available, but during July and August, 1901, in the Imperial Yeomanry Hospital, Pretoria, I had under my care, in a ward specially set apart for dysentery patients, eleven acute cases and ten cases of chronic diarrhœa, following previous attacks of acute dysentery. All the acute cases were treated with sulphur and Dover's powder, and the chronic cases with sulphur alone, and in every instance a cure resulted.

The opium brings comfort to the patient, and by its inhibitory effect upon intestinal peristalsis controls the diarrhœa and keeps the ulcerated portion of the intestine at rest, and by this means allows the antiseptic qualities of the sulphur to take effect under the most favourable circumstances. The precise mode of action of sulphur in the intestines is more or less a matter of conjecture. It is, however, reasonable to believe that sulphuretted hydrogen, and other sulphur acids, are formed, and inhibit the growth of the micro-organism of dysentery. The amœba has been carefully searched for by Dr. Washbourn and Sergt. J. Mann, the bacteriologist at Deelfontein and Pretoria Imperial Yeomanry Hospitals, but has never been found.

It is perhaps a justifiable speculation that the dysentery of South Africa is, like the epidemic dysentery of Japan (investigated by Shiga) and the dysentery of the Philippines (Flexner), due to a specific bacillus, morphologically approaching the type of the bacillus typhosus. Below two cases are quoted. (1) Acute Dysentery, (2) Chronic Diarrhœa following Acute Dysentery.

1. Acute Dysentery.—Pte. G. W., aged 18, admitted July 26th, 1901. Suffering from acute dysentery. The patient had been ill for five days with diarrhœa, and for the last two days his bowels had been open ten times a day, and the motions had consisted of nothing but blood and mucus. Tenesmus was very troublesome, and he complained of severe griping pains in the abdomen, especially at night. In the evening of 25th the temperature rose to 103°, there were sordes on the lips, and the patient was in great distress and very feverish. Bowels were opened twelve times on the 26th, and treatment commenced at 10 p.m.

July 27th.—The patient was in much less pain and the tenesmus was relieved. Bowels opened only twice in the night of 26th, and three times during the day. Temperature again rose to 103°.

July 28th.—Temperature only rose to 99·2 in the evening. Bowels opened twice last night and only once in the day, and no blood and mucus was passed after this morning, with the exception of a trace of blood and mucus with one motion on August 1st.

July 29th.—Temperature again rose to 101·8 in the evening, and there were six movements of the bowels in the night. After this the temperature remained normal or subnormal, and the patient made an uninterrupted recovery.

Judging from the evening temperature and constitutional symptoms in this case, it seems probable that severe ulceration with absorption of toxic products was taking place, and that it was cured (in three days) by the administration of sulphur and Dover's powders, while the passage of blood and mucus practically ceased in thirty-six hours.

2. Chronic Diarrhœa following Acute Dysentery. — Trooper D., I. Y., aged 31, admitted to I. Y. H., Pretoria, on June 21st, 1901. He had had two severe attacks of dysentery, the first one in February and the second in April, and since the first attack he had suffered from chronic diarrhœa. His bowels have been very irregular, sometimes as many as eight or nine motions in twenty-four hours, and often four or five motions, whilst at other times he is constipated for two whole days at a time, occasionally he passes a little mucus but no blood. Patient has had several kinds of treatment, including bismuth and opium with little or no benefit. On July 12th he was given farinaceous diet with 4 oz. of port, and sulphur sublimat. 20 grs. was ordered t.d.s. On July 13th and 14th his bowels were opened four times each day, and three times on July 19th. On the other days, and after this, his bowels were quite regular, being opened once or twice each day. On July 27th he was given chicken diet and no diarrhœa resulted, and his bowels continued to be quite regular after the sulphur was omitted.

Here a patient, who had suffered from dysentery and chronic diarrhœa for five months, was cured in a few days by the administration of sulphur alone, and showed no tendency to relapse after treatment.

Sulphur is, from its solidity and non-absorbability, an ideal intestinal antiseptic; that it passes along the whole intestinal track is shown from the fact that it can be seen suspended as a yellow powder in watery motions. With sulphur, the stools become much less offensive, and no trouble arises from flatulence. Whatever is the true cause of dysentery, sulphur seems capable of controlling it and curing it, and it is possible that it may be found of service in cases of summer diarrhœa in England, and perhaps in cases of enteric fever.

In one case of phthisis, admitted with probable tubercuious ulceration of the colon following previous attacks of dysentery three months before, sulphur was given with great benefit, and all abdominal pain and hyperæsthesia disappeared. The apparent success of sulphur in dysentery raises an interesting question as to the rationale of the good results attending administration of magnesium and sodium sulphate in dysentery. Are these results due to the purgative properties of these drugs acting as an intestinal flux, and so washing away the cause of the disease and allowing nature to effect a cure, or do they also exert an inimical effect on the growth of the micro-organism owing to the presence of sulphur acids?

APPENDIX TO MEDICAL REPORT.

By W. LANGDON BROWN, M.D., M.R.C.P.,

Senior Physician (July-Sept. 1900); Assistant Physician to the Metropolitan Hospital.

Enteric Fever.

As the use of urotropin in enteric fever has been urged as a routine treatment* to prevent the spread of infection to others through the urine, it seemed specially desirable to employ it under the circumstances obtaining in South Africa. It has been stated that the drug is almost invariably well borne. The following cases show that even as small a dose as ten grains, three times a day, may be followed by hæmaturia.

Case 1.—A Captain, aged 33, who had been inoculated, was admitted on Sept. 20th, 1900, suffering from enteric fever. He had been ailing for some weeks and had been ill and delirious for four days before admission. He was given ten grains of urotropin in water, three times a day. About two days later he complained of some pain and difficulty in micturition. On September 27th, blood was passed in the last portion of the urine. On September 28th, blood was seen oozing from the meatus; the urine was smoky in appearance and not scanty in amount. The administration of urotropin was stopped and potassium bicarbonate and tincture of hyoscyamus given instead. A little more blood was passed the same evening. On September 29th, there was no pain in micturition and no blood in the urine.

Case 2.—A Lieutenant, aged 24, who had been inoculated, was admitted on Sept. 21st, 1900, suffering from enteric fever. He had been ailing a few weeks, and had been ill in bed for two days prior to admission. He was given ten grains of urotropin in water, three times a day. On September 27th, he had some pain and difficulty in micturition. On September 28th, blood appeared in the urine, actual clots being seen. The urotropin was stopped, and potassium bicarbonate and tincture of hyoscyamus was given instead. The next day the symptoms were much alleviated and soon disappeared.

The occurrence of hæmaturia in two patients admitted on successive days after urotropin had been given for eight days in each case, and its rapid subsidence after the drug was stopped, are too striking to be a coincidence. The drug, though of undoubted value, is not quite so free from injurious effects as has been thought. Discomfort, which preceded the hæmaturia in both cases, should be considered a danger signal when employing urotropin. The best way of avoiding a bad result is to follow its administration by a large draught of water.†

* Horton-Smith, *Goulstonian Lectures*, 1900.

† See also *Brit. Med. Journal*, 1901, Vol. I., p. 1472.

APPENDIX TO MEDICAL REPORT.

Dysentery.

The most obstinate cases were among the prisoners who had been taken at Lindley in May, 1900, and who were not released from Nooitgedacht till the end of August. Many of these had suffered from dysentery for two months or more without any treatment or special diet, so it is not surprising that in them the disease was somewhat intractable.

Convalescents were frequently troubled with a mucous colitis lasting some weeks or months, even after returning to England. In the slighter cases this simply took the form of passing about half an ounce of mucus on first getting up in the morning, and was apparently related to the change of posture.

Malaria.

Most of the cases admitted to the hospital during the Eastern advance had suffered from malaria previously, in India or Rhodesia for instance. As the advance took place at the end of the winter, it may be that the anopheles were not then abundant, but under appropriately climatic conditions the hæmamœba again became active in those previously infected. In this connection it is interesting to note that while the transports were passing the West Coast of Africa, several persons who had previously suffered from malaria had a return of the disease, though the ship was far from land. No case occurred, however, in any one who had not had malaria before.

Heat Stroke.

One case sent in as such occurred in a young officer who had been subjected to much mental anxiety. Ordinarily he seemed well and cheerful, but on the slightest exposure to the sun he complained of severe pain in the neck, occiput, and eyes. At such times he was much depressed, and referred the pains to causes obviously erroneous—such, for instance, that he had just been struck on the head by one of the servants. After lying down in the shade and taking a dose of bromide of potassium and chloralamide he would express himself as feeling much better, and say he was afraid he had been talking nonsense. As the weather got hotter these attacks became more frequent, and he was invalided home.

Simple Continued Fever.

There has been so much discussion as to the existence of a simple continued fever, apart from the commonly recognised febrile disorders, that a short description of the types which came under my notice may not be out of place.

1. *Cases with sudden onset.*—In these, abdominal symptoms were generally lacking, and rather rapid defervescence occurred between the fifth and seventh day. This seems to be the type called Johannesburg influenza or Pretoria fever, and it is

really more like influenza than anything else. In such a dry climate it is not surprising that pulmonary complications are much rarer than in England. In one patient who had been three days on a bullock waggon while suffering from the fever, well-marked bronchitis followed.

2. *Cases with gradual onset.*—Most of these are enteric. It is not infrequent to find a mild attack of continued fever followed by a relapse typical of enteric, or on resumption of a meat diet a rise of temperature resembling the 'febris carnis' of enteric. In this type of fever the temperature is raised for a week or a fortnight; no enlargement of the spleen may be detected and no spots seen.

Another type which appears to be enteric is a continued fever lasting at least three weeks, often longer. Beyond the pyrexia (the temperature often remains at 103° for several days) and a very furred tongue, there may be no symptoms at all. The patient may feel quite well, his appetite is good, and his sleep sound; yet more than one case occurred where after a fortnight a crop of rose-coloured spots appeared, the spleen was felt to be enlarged, and the chart was that of a relapse in enteric.

It would appear that the majority of cases of simple continued fever are probably enteric fever; another considerable section resemble influenza more than any other known disease. But there still remains a residuum of cases to which it is impossible to put a definite name at present. They may be due to a specific fever hitherto undescribed (see cases of Malta fever) in South Africa. An extensive application of the agglutination test would be necessary to settle the point. One case of prolonged fever in which I had the opportunity of applying Widal's test on his return to England gave a negative result.

SURGICAL REPORT.

By A. R. J. DOUGLAS, M.B., B.S., F.R.C.S., and
HERBERT WILLIAMSON, M.A., M.B., B.C.,
Surgeons to the Hospital.

(*August* 1900 *to June* 1901.)

The following brief record of the Surgical work at the Pretoria Hospital will, it is hoped, give some idea of the kind of cases with which a base hospital is called upon to deal, and of the form of treatment which, under varying circumstances, we thought it best to adopt. Cases illustrating some particular point and those of special interest are quoted in some detail. It is a matter of regret that we have not been able to learn the subsequent histories of many of our patients; but, as the majority of them belonged to irregular corps recruited in various parts of Greater Britain, this has been impossible.

Antiseptics.

The cases for operation were all prepared in the same way. The patient was given a bath, and the part to be operated upon was shaved, then scrubbed thoroughly with soap and water, using a sterilised nail-brush; next, it was washed over with turpentine or ether to remove soap or grease, then scrubbed for three minutes with a spirit lotion of one-in-five-hundred biniodide of mercury, and this finally washed away with a solution of one-in-four-thousand biniodide of mercury; a dressing was then applied of the double cyanide gauze; this was covered with sterilised jaconet, and outside a layer of cotton wool.

When the patient came on to the operating table, the site of the operation was surrounded with sterilised towels, and again washed over with the spirit lotion. The instruments and ligatures were sterilised by boiling, and during the operation were kept in a tray under one-in-sixty carbolic acid. The hands of the operator and his assistant were sterilised in the same way as the patient's skin, except that the turpentine was omitted. The sponges used have been already described; these were boiled for half an hour and used out of perchloride or biniodide lotion,

For the dressing of wounds the same procedure, in a more or less modified form, was adopted. We were able by these means to ensure union by first intention in nearly all instances in which suppuration did not previously exist. Many cases of severe suppuration were from time to time admitted into the wards, almost all compound fractures being received in a septic condition. There were several reasons for this. Sometimes, on a long trek, the wounded could not be dressed for three or four days together; in other cases they could not be reached and brought in for many hours, and patients have described to us how they lay upon the ground surrounded by dead animals which rapidly became putrid, and how the flies passed from the carcases of these animals to settle upon their wounds. The cases from one engagement which occurred in December were virulently septic, so much so that both the surgeons who operated upon them sustained poisoned fingers. Soon after this convoy was received two or three instances of suppuration occurred in cases which ought to have healed by first intention, but by exercising increased care we were able to check this.

These suppurating cases cleared up remarkably quickly. We attributed this to the healthy situation of the hospital and to the constant supply of fresh air which residence in the tents insured.

Gunshot Wounds.

The greater number of the gunshot wounds which came under our care were inflicted by Mauser bullets, less frequent were Martini-Henry wounds, whilst other forms were met with only occasionally. Of shell wounds we saw very few. Wounds caused by expanding bullets were brought in not infrequently, particularly after the fights at Rhenoster Kop and Nooitgedacht.

We found it very difficult to get any reliable information as to the range at which wounds were sustained, the men wounded in the same engagement often estimating the distance very variously.

In the following account we have endeavoured to group the cases as nearly as possible into the various classes which are considered in the works on military surgery.

Gunshot Wounds of Head and Neck.

Between the months of August and April fourteen cases of gunshot wounds of the head and neck were admitted. The whole of these cases recovered. Two were complicated by gunshot wounds in other parts of the body.

It is interesting to notice that ten of these patients were wounded either at Rhenoster Kop or at Nooitgedacht, thus illustrating a fact, which has been noticed more than once during the war, that in any particular engagement, from the

nature of the ground and from the disposition of the troops, a considerable portion of the wounded received their injuries in one region of the body.

The most striking feature of these cases was the comparatively small amount of damage resulting from bullets which had completely traversed the head and neck, in the neighbourhood of important structures. The following cases afford examples of this fact, and are interesting in various other ways.

Case 1.—A Trooper, wounded at Nooitgedacht, was admitted into No. 1 Ward sixty hours after the injury. A Mauser bullet had entered immediately internal to the sterno-mastoid muscle, about the level of the cricoid cartilage, and traversing the neck emerged in the middle line behind, at the level of the fourth cervical vertebra. The wound healed by the first intention, and beyond slight dyspnœa, lasting for a few hours, the patient presented no symptom of injury, and was able, in the course of a few weeks, to return to duty.

Case 2.—A Private in the Dublin Fusiliers was wounded by a Mauser bullet during the fighting north of Pretoria. The bullet entered on the right side, 3 inches above the clavicle, piercing the sterno-mastoid-muscle. It passed almost horizontally across the neck, the wound of exit being situated immediately behind the posterior border of the left sterno-mastoid, at a slightly higher level. It seemed certain that the bullet must have injured the pharynx, but no damage could be discovered on laryngoscopic examination. The wound had suppurated, and an abscess had been opened, before admission, above the right clavicle. After admission, the patient suffered for some time from difficulty in swallowing, and could take fluids only; there was also present slight contraction of the right sterno-mastoid. This patient improved rapidly, and was sent home on account of the contraction of the muscle.

Case 3.—A Private wounded at Nooitgedacht. The bullet entered the frontal bone, 1 inch above the external angular process, and passed horizontally across the skull. The wound of exit was situated at a corresponding point on the opposite side. The wound suppurated slightly, but no evidence of any injury to the nervous system could be detected.

We would mention three other cases of this class of injury which present points of special interest.

Case 4.—Private J., of the Northumberland Fusiliers, was wounded by a soft-nosed bullet. This entered the chest immediately below the right clavicle, passed through the soft parts deep to the bone, and emerged in the supra-clavicular fossa. It then continued its course, carrying away a large portion of the right cheek and lower jaw. On admission the whole of the right side of the face was occupied by a large gaping septic wound. The patient was given an anæsthetic, numerous fragments of bone removed, and the wound thoroughly cleansed by scraping and the application of pure carbolic acid. Owing to careful nursing, the patient made an uninterrupted recovery, and in the course of a few days, after ineffectual attempts to smoke in the ordinary way, he amused the ward by holding the cigarette in one nostril, and blowing the smoke down the other.

Case 5.—Private MacS., of the Northumberland Fusiliers, was wounded at Nooitgedacht by a Mauser bullet. He was shot at close quarters, and it was impossible to say which was the wound of entrance and which the wound of exit, each wound being quite small and circular. He was admitted four days after the injury. One wound was situated internal to the sterno-mastoid, at the level of the cricoid cartilage on the right side; the other on the right side of the chest, in the ninth interspace, and about 3 inches from the middle line. On admission he suffered from severe

dyspnœa and slight hæmoptysis; he also complained of pain in the chest, with a burning sensation in the right arm. The temperature was slightly raised (100° at night). No injury to any important structure in the neck could be detected. There was no paralysis or anæsthesia of the right arm. The right side of the chest moved only slightly on respiration. On percussion, dulness was present as high as the upper border of the third rib in front; over this area vocal vibrations, vocal resonance, and breath sounds were absent. The heart's apex was displaced outwards for 1½ inches.

During the first week in hospital no changes occurred in the physical signs in the chest, but at the end of that time the temperature began to rise steadily until it reached 104°. His dyspnœa increased, and his pulse became slightly irregular. We concluded that he had developed a pyo-hæmothorax; a needle was inserted, and a blood-stained, turbid, offensive fluid drawn off. A portion of the eighth rib was resected in the line of the angle of the scapula, and some pints of decomposing blood evacuated. The patient remained in hospital for nearly six months, and was then invalided home with the wound almost healed, but the chest had fallen in considerably, and the lung had not expanded satisfactorily. The pain in the right arm had almost gone.

Case 6.—A patient was admitted to No. 1 Ward who had been wounded in the neck by a Mauser bullet. The wound of entrance was situated internal to the right sterno-mastoid, about an inch above the clavicle. The wound of exit was situated at the same level, about an inch from the spine. On admission there was complete paralysis of the right arm, with loss of sensation. He suffered no pain. During his stay in hospital the arm wasted rapidly, and no recovery of movement or sensation took place. He was invalided home.

The cases we have quoted are typical of the whole group which came under our care. Although in many instances the bullet must have passed close to the great vessels, we met with no case of aneurysm of the carotid or subclavian, or of severe hæmorrhage. Upon the whole, it was rare to find severe pain connected with these wounds, and only in one case did an abscess form in the track of the bullet. The fact must not be overlooked that many of those wounded in the neck, in whom the vital structures were involved, did not live to reach a base hospital.

Gunshot Wounds of Chest.

During the period we are considering ten cases of gunshot wounds of the chest were admitted. Of these only one was a non-penetrating wound, whilst in the other nine cases the bullet had injured some of the thoracic viscera. Amongst these we have not included cases which are described under other headings. (*See* Gunshot Wounds of Spine, Cases 1 and 3.) The whole of these cases recovered; six were able to return to duty and four were invalided to the base. These figures may be misleading, for it must be remembered that many cases of severe chest injuries died on the battlefield.

Illustrative Cases.—(1) Non-penetrating cases. The following case illustrates well the kind of wound which may be inflicted by an expanding bullet:—

Pte. W., of the Cameron Highlanders, was admitted into hospital a day or two after the receipt of his injury. On admission there was a large irregular wound of the chest in the left

pectoral region. Almost the whole of both pectoralis major and minor muscles had been carried away, and several of the intercostal muscles over the upper spaces were laid bare. As the patient had not been under shell fire it was obvious that the wound must have been inflicted by an expanding bullet. On admission the wound was suppurating badly; but there was no evidence of any injury to the contents of the chest. The wound rapidly granulated over; but later several pieces of necrosed rib had to be removed. After six weeks the patient was invalided to the base, at this time the wound had healed except for one small sinus. There was practically no interference with the movement of the arm. In spite of a large sloughing wound so close to the lung the inflammation did not extend to the subjacent viscera.

Penetrating Wounds.—In every case which came under our care there was injury of the lung and hæmoptysis. In four cases there were fractures of the ribs, in two cases there was hæmothorax with subsequent pyothorax, and in one case pneumothorax (*see* Spine, Case 3). None of these cases were seen until some hours after the receipt of the injury; but in most of them the three symptoms, shock, dyspnœa, and hæmorrhage, were still present.

Case 1.—An Officer, in the West Riding Regiment, was wounded at Rhenoster Kop by a Mauser bullet; the bullet entered in the fourth left intercostal space in the posterior axillary line, and passing downwards and to the right across the chest emerged at the seventh space close to the spine on the right side. He was admitted into hospital the following day. At this time he was suffering from shock and severe dyspnœa, and still had slight haemoptysis. The chest was held rigid during respiration, and at intervals he suffered from very severe attacks of coughing which were attended with much pain and dyspnœa. The physical signs on the two sides of the chest presented very little difference. The spasms of coughing were greatly relieved by hypodermic injections of morphia, and by strapping the chest. He rapidly improved, and both the entrance and exit wounds healed by first intention. At a later stage an X-ray photograph of the chest was taken, and revealed the fact that a fracture of two ribs had occurred close to their angles. Although the patient had been carefully examined more than once with this possibility in view the fracture was not detected.

Case 2.—Pte. MacS. (*vide* G. S. W., Head and Neck, Case 5). This was an example of wound of the lung with hæmothorax which subsequently became converted into a pyo-hæmothorax.

Case 3.—Corpl. B., of the Imperial Yeomanry, was wounded by a Mauser bullet which entered on the right side of the chest at the third interspace in front, the bullet passed downwards and to the left and emerged at the level of the ninth rib behind, about one and a half inches from the spine. On admission the patient suffered from a high temperature (103° at night), his pulse was weak, and severe dyspnœa was present. On respiration the right side of the chest moved very slightly, there was dulness with diminution of breath sounds and vocal resonance at the base of the right lung. At the wound of exit there was a sinus which tracked outwards and led into a localised abscess cavity, whilst a probe, passed inwards towards the spine, grated on bare bone. An anæsthetic was given and the wound explored; portions of the eighth and ninth ribs were removed, together with several pieces of the casing of the bullet, the pleura was incised, and an empyema drained. The temperature came down at once, and remained down for three or four days. At the end of that period a rise again occurred, and the pleural cavity was washed out with a weak solution of iodine.

Immediately after this the temperature rose to 104° and for eight days remained up, sometimes reaching 105·2°. The pleural cavity drained well, and eventually the temperature gradually came down until the normal was reached. He left the hospital three months later: by this time the sinus had completely healed, and the lung had expanded well.

Case 4.—Lieut. W., Wiltshire Regiment, was shot through the right lung. On admission he suffered from the usual symptoms of dyspnœa and hæmoptysis. No abnormal physical signs of any kind could be detected in the chest. Both wounds healed by first intention. The interesting feature of this case was the temperature, which for four or five days remained persistently between 103° and 104°, although no hæmothorax was present, and no suppuration took place. A temperature of this kind is not at all an unusual occurrence in this class of wound.

Case 5.—Lieut. H., of the Scottish Horse, was wounded by a Mauser bullet. The wound of entrance was situated over the fourth intercostal space, one and a half inches internal to the nipple line, thus lying immediately over the heart. The bullet remained in the chest. On admission the patient suffered from dyspnœa and hæmoptysis. Pus was issuing from the external wound. A probe, passed down the sinus, entered the chest, and deep to the ribs, passed in a direction downwards and backwards. The temperature was raised (102°). No physical signs indicating damage to the lung could be discovered. A drainage tube was passed down the sinus and gradually shortened—in the course of a fortnight all suppuration had ceased and the wound had healed. By means of the X-rays the bullet was discovered lying apparently in front of the heart, at a level a little below and external to the wound of entrance. In attempts to obtain a photograph a long exposure was necessary, and the whole of the area exposed to the light developed a red papular rash which persisted when the patient was last seen two months later.

These cases illustrate very well the following facts:—(1) That in nearly all cases of penetrating wounds the lung is injured. (2) That the symptoms of such injury are shock, dyspnœa, and hæmoptysis, and that these usually pass off within a few days. (3) That, unless the injury is so severe as to lead to death within a few hours, the prognosis as to life is good. (4) That, although many cases of simple wounds of the lung do not develop a high temperature, in some cases this is present, and does not necessarily indicate suppuration or even extensive hæmothorax.

Although our cases made rapid progress towards recovery, two symptoms nearly always persisted for some weeks—namely, (1) severe pain on respiration, often necessitating strapping of the side, and (2) dyspnœa on the least exertion.

Gunshot Wounds of Spinal Column.

We were called upon to treat only three cases of bullet wounds of the spine with injury to the spinal cord, and in each case unfortunately the termination was a fatal one. These patients were all injured in the night attack by the Boers upon General Clements' camp at Nooitgedacht. They unfortunately lay upon the ground for three days before help could reach them, and then had to undergo a journey of forty miles in the ambulances. As the result of this, by the time we

received the patients they were in a deplorable condition, suffering from bed-sores and cystitis. The details of the cases are as follows :—

Case 1.—An Officer, aged 21, was shot by a Mauser bullet from behind forwards. The bullet entered behind, at the level of the sixth cervical vertebra, and passing completely through the body issued in front to the right of the sternum. He presented the symptoms of complete division of the cord at that level, namely: paraplegia; anæsthesia with a hyperæsthetic zone; loss of knee-jerks; retention of urine; incontinence of fæces; abdominal distension and loss of thoracic breathing. In addition to this he suffered from a large sloughing sore over the sacrum, and from cystitis. Owing to the paralysis of respiratory muscles he was cyanosed. He lived for over a week, dying from hypostatic congestion of the lungs, and from exhaustion. Post-mortem: The body of the sixth cervical vertebra presented a clean round hole through which the bullet had passed; there was no hæmorrhage outside the spinal dura-mater. On opening the membranes, the cord was found to be completely pulped for about $1\frac{1}{4}$ inches of its length.

Case 2.—Corpl. L. This patient was wounded by a Mauser bullet which entered from the back, at the level of the sixth dorsal vertebra, and remained in the body. He presented the symptoms of a complete lesion of the cord; paraplegia; anæsthesia, with a hyperæsthetic zone situated over the lower part of the thorax; paralysis of the lower intercostal muscles: retention of urine and incontinence of fæces. He also suffered from severe bed-sores over the back and buttocks, and from cystitis. In addition to this injury he had sustained a gunshot wound of the hand, necessitating amputation of three fingers. After admission to hospital he lived for ten days. Post-mortem: The cord was completely pulped for about an inch of its length, the lesion involving three nerve roots; the bullet was found lodged in the body of the seventh dorsal vertebra, and projecting from its posterior aspect.

Case 3.—Pte. H., also wounded at Nooitgedacht by a Mauser bullet fired at close range. The patient was lying down at the time he was hit. The bullet entered above the upper border of the scapula on the right side, traversed the right side of the chest, injuring the right lung, and continued its course obliquely downwards and to the left, emerging in the left lumber region, above the crest of the ilium. In addition to this he was wounded in the arm. On admission to hospital he suffered from paraplegia, incontinence of urine and fæces, and anæsthesia of the lower limbs; he also complained very much of tenesmus. He presented the signs and symptoms of a pneumo-thorax on the right side, suffered from cough and slight hæmoptysis. The abdomen was not distended, though it did not move freely, but on examination no definite injury could be made out. One of the most striking features of the case was the restlessness of the patient, he was continually tossing his arms about, and frequently asking to be allowed to get up. His mental condition, too, was never clear. He lived six days, and died of exhaustion. Post-mortem: On opening the chest, the right lung was found collapsed; the bullet was found to have entered the spinal column at the level of the tenth dorsal vertebra. The cord was divided at this level. On examining the abdomen the bullet was found to have traversed the spleen, leaving a hole into which two fingers could be inserted; no other viscus was injured. The abdominal cavity contained a large quantity of blood. Probably death was due largely to the continued hæmorrhage from the spleen.

These cases illustrate very well the rapidity with which complications are likely to ensue in injuries of the spine. Thus, when we first saw the patients, five days after the receipt of the injuries, large sloughing bed-sores and cystitis had already developed. These cases were amongst the most hopeless of those

which came under our care; they differed in no way from similar injuries met with in civil practice. In none of these cases was there any indication for operative treatment.

Gunshot Wounds of the Extremities Involving Injury to the Bones and Joints.

Out of the 141 gunshot wounds of the extremities treated, 45 were suffering from compound fractures. These injuries were distributed as follows:—Lower extremity: Ilium, 5; femur, 9; patella, 1; tibia, 6; fibula, 4; astragalus, 1—total, 26. Upper extremity: Humerus, 6; radius and ulna, 10; metacarpals, 3—total, 19.

FRACTURE OF RADIUS AND ULNA WITH SPLINTERING.

Injuries to the bones of the head, thorax, and spine have already been dealt with, and are not included in this section. Amongst these cases amputation was performed fourteen times—thigh, 5; leg, 1; arm, 2; forearm, 2; fingers, 4. Of these cases of compound fracture three died and forty-two recovered; details of each of the fatal cases are given below.

Considering these figures, we see that of 141 gunshot wounds of the extremities forty-five were complicated by compound fractures—that is to say, nearly 32 per cent. And of these only three patients, or 6·66 per cent., died—a very low mortality. The percentage of amputations was thirty-one. We have given as illustrations eleven cases, representing the different kinds of bone injury with which we had to deal. Still further examining the figures before us, we see that the injuries were fairly evenly distributed among the bones, injuries of the lower extremity and of the femur slightly preponderating.

The amputation most frequently performed was that through the thigh. Frac-

tures due to gunshot wounds do not differ from similar fractures met with in civil practice, either with regard to the treatment or prognosis. Most frequently the condition which leads to amputation is sepsis, and this is specially important in the fractures of large bones like the femur. In two of the patients who died the amputation was performed for this condition. More rarely injuries to the soft parts, to a large joint or to the main vessels and nerves, led to the operation.

As we have said before, the first dressing on the field is most important, and often decides the fate of a patient; this is doubly true in the case of fractures.

Considering the cases as a whole, the results were extremely satisfactory. A large number of cases were suppurating on admission, but by scraping, the use of pure carbolic acid, irrigation, and drainage, they cleared up, although in some of the cases there was necrosis before the wounds finally healed. The only case in which the hip joint was laid open was Case 7. This was not healed six months after the injury; probably a secondary operation will have to be performed.

Another point to which we have referred in describing Cases 10 and 11 is whether conservative surgery cannot be overdone. There is a temptation to try and save a limb where it will probably be useless or not so good as an artificial one. In this way, after lying in bed for months, a patient may find himself with a mended limb of so little use that it has to be amputated.

With regard to the range, it is often impossible to find out with anything like accuracy from what distance a bullet was fired. We have found that fractures at short ranges are generally clean, very few splinters being found, and that the further the range the greater was the splintering. The fractures were mostly very oblique, running often for some distance up or down the shaft.

Illustrative Cases.—

Case 1.—An Officer of the Royal Fusiliers was admitted suffering from a gunshot wound of the right arm. He was running down a kopje holding a revolver in his hand when he slipped and fell; the revolver was discharged and the bullet entered his right arm. He was admitted to this hospital next day. On admission it was seen that the bullet had passed through the arm from side to side, causing a severe compound comminuted fracture of the humerus at a point 2½ inches above the elbow joint. A portion of bone had been forced out through the skin in front of the joint. The wound was septic. It was decided after examination under an anæsthetic, to attempt to save the arm. Free drainage was established, fragments of bone removed and the limb put up in a splint. No nerve injury was detected. Some days later the patient had a smart hæmorrhage in which he lost fully a pint of arterial blood, the bleeding was controlled by compressing the brachial artery for over an hour. This was followed by thrombosis of the veins of the arm. Two months after the injury further pieces of necrosed bone were removed, at the end of three months the humerus shewed no signs of union; but after four and a half months scarcely any movement could be obtained between the fragments, and the patient could raise his arm slightly. A month later union was quite firm, but recently some small pieces of necrosed bone have had to be removed.

This case is of interest because the arm was saved in spite of a wound of great severity. At the present moment there is some limitation of movement at the elbow-joint on account of the thickening of the lower end of the humerus.

Case 2.—Lieut. C. was wounded by a Mauser bullet at Rhenoster Kop. He was admitted some hours afterwards suffering from a compound comminuted fracture of the left femur at about the junction of the upper and middle thirds. The wounds of entrance and exit of the bullet were small. Under all aseptic precautions the wound on the outer side of the thigh was enlarged, splinters of bone removed (the femur had been comminuted for about 3 inches of its extent), a drainage tube inserted with a counter opening behind, and the leg put up in a long Liston splint. The wound did not suppurate, and soon healed. For about four months the fragments were distinctly movable, but six months after the injury the patient could walk about without crutches. He had then rather less than 2 inches of shortening: a very successful result, and to a large extent due to the first field dressing, which kept the wound clean.

FRACTURE OF THE ULNA.

Case 3.—Trooper B., an Imperial Yeoman, wounded at Nooitgedacht, was admitted about a week after the receipt of the injury with a compound comminuted fracture of the right femur at the junction of the lower and middle thirds, caused by a Mauser bullet. On admission the wounds were suppurating freely, the right thigh was enormously swollen and œdematous, and pus could be squeezed out from the seat of the fracture. The patient was very ill. It was hoped that if his leg were freely drained he might so much improve so as to admit of amputation being performed later. The thigh was very freely drained, fragments of bone removed, and the seat of the fracture freely irrigated. The patient remained about the same for some days, then began to get rapidly worse. The leg was amputated as a last chance, but he died some hours afterwards. In this case the cause of the patient's death was the septic condition of the wound. This and the previous case in many points resembled one another, but in the one the wound became septic, whilst in the other owing to the first dressing the wound remained clean and the patient recovered with a useful limb. These cases emphasise the importance of the field dressing.

Case 4.—A patient was admitted after the disaster at Nooitgedacht, who had been wounded in the left thigh, and by a second bullet in the left forearm and wrist. Four days elapsed between the receipt of his injuries and his arrival in hospital. Both wounds were in a very septic condition, the leg was swollen and œdematous. The left femur was fractured and much comminuted, and pus was escaping from the wound. The wrist joint was opened and in a very septic condition, and one or two of the carpal bones were missing. The patient's condition was considered almost desperate, but as he seemed somewhat better next morning, operation was decided upon. The only possible

course was found, upon examination, to be amputation of both limbs. This was done. Severe shock ensued, but this was recovered from, and for two days the patient's condition improved steadily, and hopes were entertained of his recovery, but on the third night he became suddenly worse and rapidly sank.

Case 5.—Trooper M. was one of the first patients admitted to the hospital suffering from a bullet wound of the right leg. He was brought into the hospital about nine days after the receipt of the injury. On admission there was seen to be a large wound, the bullet having carried away part of the upper extremity of the tibia, leaving behind the articular portion. The right knee joint was much distended with pus, and the wound itself was in a very septic state. The patient's condition was such that amputation was not considered advisable, so incisions were made into the joint, free drainage established, and the wound itself cleaned up. Patient's condition improved after this, and the leg was amputated two days afterwards just above the condyles of the femur. He then made an uneventful recovery. This case illustrates the very complete way in which the bone is often removed by a bullet. Though the hole in the tibia was irregular yet there were very few splinters of broken bone left behind. The fracture had extended into the knee joint, but the femur was not injured. Considering the nature and septic condition of the wound and the patient's condition, his reovery was fortunate.

Case 6.—Capt. B. was wounded at a range of about 15 yards by a Mauser bullet. He was admitted to the I.Y. Hospital thirteen days after the injury. On admission he had a healed wound of the abdomen, in the region of the costal margin. In addition to this a bullet had carried away the oleeranon process, and about 2 inches of the ulna, including the sigmoid cavity. A gaping wound of the elbow joint was left, at the bottom of which could be seen the polished trochlea surface of the humerus. The radio-humeral joint was not affected. In this case again the bone was carried clean away by the bullet. Another bullet had entered on the dorsum of the left hand, and after fracturing the second and third metacarpal bones, had passed out in front of the wrist, about ½ inch above a line drawn between the bases of the two styloid processes. It was doubtful at first whether the ulna nerve was divided. There was complete anæsthesia over the area supplied by this nerve, and also paralysis of the ring and little fingers, but sensation was soon partially re-established. The bullet, which had passed through the wrist, caused considerable matting of the tendons, and the joint was so stiff that it was difficult to say exactly what was the amount of paralysis. The condition improved very much under massage. The median nerve was not injured, although the bullet must have passed very close to it. The wound of the elbow gradually closed, but left very little movement in the joint. Probably some further operation will be necessary later on. It will be interesting to see this arm in six months' time.

Case 7.—Lieut. O., of the West Riding Regiment, was wounded by a Mauser bullet at Rhenoster Kop. The bullet entered in front, above Poupart's ligament, and emerged behind, near the lower border of the buttock. There was very slight shortening of the leg, but eversion was marked. There was an escape of pus from the wound both in the front and behind. An anæsthetic was given, and the wound thoroughly cleansed. When a finger was introduced, the neck of the femur was found to be fractured, and the hip joint opened. Several fragments of bone were removed. Both wounds were opened up and drainage tubes inserted. The fractured leg was put up on a long Liston's splint. The patient was very ill for many days, frequently vomiting, and had a high temperature and a frequent small pulse. The general condition, however, improved. The wounds were irrigated through twice and then once daily, and several more pieces of necrosed bone were taken away. He remained in hospital with us nearly three months, and at the end of that time was transferred to the base. Some union at the back of the neck of the femur had taken place.

Case 8.—A Private of the Northumberland Fusiliers was wounded by a Mauser bullet, which entered the gluteal region, fracturing the ilium and passing on into the pelvis. The fracture was a very extensive one, and was followed by very considerable necrosis. On several occasions incisions were made and necrosed bone removed. In spite of this the temperature remained high, and intrapelvic suppuration was suspected, although there were no definite signs or symptoms to point to its situation. After death, almost the whole of the pelvic cellular tissue was found to be acutely inflamed, and several small abscesses were discovered.

WIRED OLECRANON.

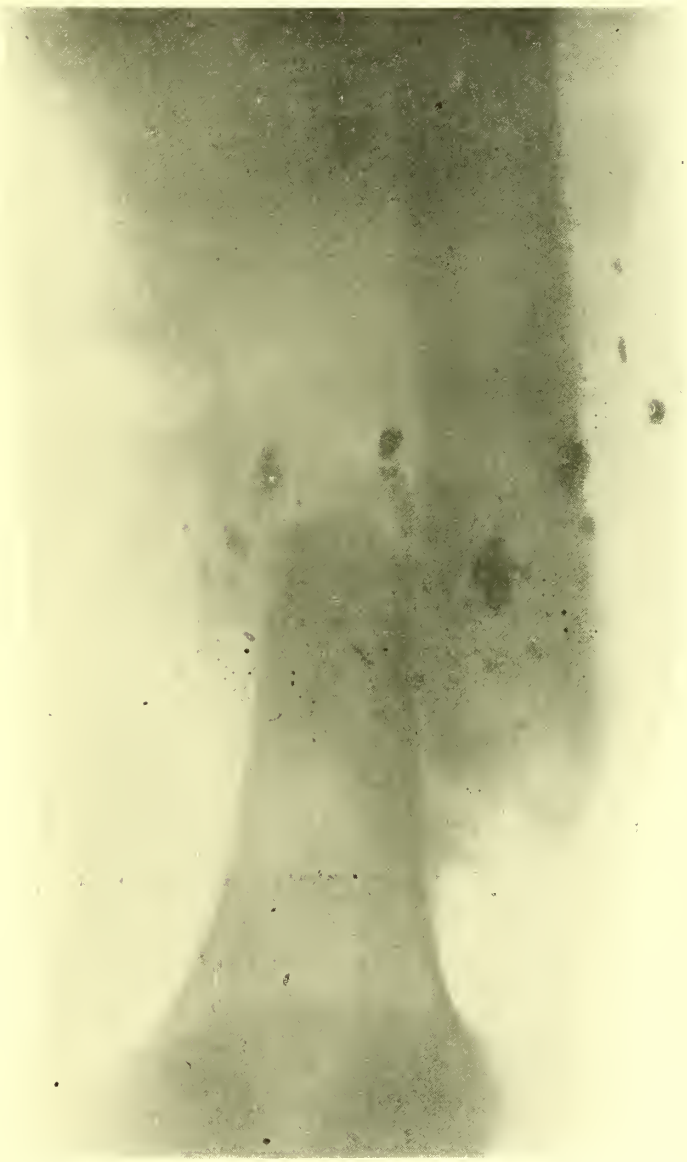
Case 9.—An Officer in the Lincoln Regiment was wounded by a Mauser bullet, which passed almost transversely across his buttocks from left to right. The bullet entered $2\frac{1}{2}$ inches below the crest of the ilium on the left side, in a line nearly vertical from the centre of the crest. It passed longitudinally across, and remained embedded in the patient's back somewhere on the opposite side. A hæmatoma formed in the track of the bullet; this suppurated, and a counter opening was made just to the left of the middle line below the posterior superior spine of the ilium. The patient was admitted to the hospital six weeks afterwards, as the sinus refused to heal. This was probably partly due to the presence of the bullet, but also in part to the presence of dead bone, the surface of the ilium having been grooved by the bullet. The bullet was located, by the means of X-rays, in the gluteal muscles on the right side, lying near the surface of the ilium. It was also located at the time of the operation by means of the 'Telephone Probe,' kindly lent by the late Professor Hughes, of the Welsh Hospital. It was easily discovered and removed. The sinuses were scraped, and eventually closed.

This case shows the value of the X-rays, as the bullet was lying in the opposite side of the body and far from the wound of entry. The 'Telephone Probe' was only used in this case from curiosity, all forms of special bullet probes having of course been rendered obsolete when the X-rays are available.

It is often a difficult matter to decide in cases where a portion of the shaft of the femur has been badly comminuted whether, supposing that union

should eventually occur, a useful limb can result. The following two cases illustrate this point:

Case 10.—Serg. M. was admitted from Rietfontein. A month previously he had been shot by a Mauser bullet. Great comminution of two inches of the shaft of the femur had occurred. The leg was not in good position. There was a large sinus, from which a very free discharge of pus was taking place. An anæsthetic was given, and the sinus opened up. Several large fragments of bone quite dead and bare were removed. No union had occurred, and one or two pockets of pus in between the muscles were discovered. Incisions and counter openings were made and drainage tubes inserted. The wound was irrigated very freely twice daily, and gradually all suppuration ceased. Some union occurred, and in the course of three months this became sufficiently strong to allow the patient to stand upon the leg and to get about with the help of crutches. The knee-joint, however, had become anchylosed, and was quite immovable. There were two inches of shortening. The patient was sent home, but it is extremely doubtful if the leg will ever be of any use to him, and if amputation when he was first seen would not have been the better treatment.



FRACTURE OF THE FEMUR: FRAGMENTS OF BULLET.

Case 11.—A Private in the Liverpool Regiment was wounded at Helvetia. He was admitted to our hospital four months after the injury; he had had a compound fracture of the left femur about the junction of the upper and middle thirds, caused by a Mauser bullet. On admission the bone was firmly united, but the fragments were overlapping about 2 inches. There was some necrosed bone and several sinuses discharging pus at the back of the thigh, extending up to the fold of the nates. In addition to this the posterior tibial nerve was paralysed owing to some injury. So that, although there was firm union, the patient was left with a useless limb, and became very

weak from the profuse discharge. He had spent four months in bed. The thigh was amputated just below the small trochanter. The patient did well, and was up and about a few weeks afterwards. In this case there was a severe fracture combined with a nerve injury. An attempt was made to save the limb, but time and a great deal of suffering would have been saved if the leg had been amputated in the first place.

Injuries to Blood Vessels.

Only one case of secondary hæmorrhage occurred. This has already been mentioned under injuries to bone. It was a case in which there was a compound comminuted fracture of the humerus, the wound having subsequently suppurated, ulceration had taken place into one of the branches of the brachial artery. The brachial artery was digitally compressed for an hour, and the hæmorrhage ceased and did not return. One case of traumatic aneurysm of the third part of the axillary artery, and two cases of arterio-venous aneurysm of the superficial femoral artery were admitted. In the two latter cases the aneurysm was excised with complete success.

The last three cases are described below.

Case 1.—Trooper B., of the New Zealand Contingent, was admitted, after an engagement at Rhenoster Kop, suffering from a Mauser bullet wound through the lower part of his right axilla, the bullet passing from before backwards in the neighbourhood of the third part of the axillary artery. The wounds of entry and exit healed by first intention. The pulse at the right wrist was not so strong as that on the opposite side, and the patient complained of numbness and pain down the arm, though no paralysis or anæsthesia could be made out. A week after admission a thrill was felt over that portion of the axillary artery near the track of the bullet. The patient was kept in hospital and watched. The thrill became gradually more marked, and the sac of an aneurysm appeared and rapidly increased in size. The arm had a bluish look, and the radial pulse was scarcely felt. It was eventually decided to ligature the third part of the subclavian artery, as it was thought that this would not cause so much interference in the circulation as would dissecting out the aneurysm. The operation was followed by very severe pains in the arm. Dry gangrene set in, and extended to just above the elbow joint. The arm was watched for six days to see how far the gangrene would extend, and then the thrill was felt to be returning. The question arose as to whether the arm should be amputated at the shoulder joint, so removing the aneurysm, or lower down distal to the aneurysm. It was decided to do the less severe operation. His arm was amputated at the junction of the upper and middle thirds. The aneurysmal sac became completely obliterated, and the patient made a good recovery.

Case 2 (operation by Mr. Stonham, who kindly took duty at the hospital during illness of both the surgeons).—A Private was wounded at Nooitgedacht by a Mauser bullet, the bullet passing through his right thigh from side to side, without injuring the bone. The wounds of entry and exit were quite small, and healed by first intention. The patient was not admitted to the Imperial Yeomanry Hospital till five weeks afterwards. On admission he was found to be suffering from a traumatic aneurysm of the femoral artery in Hunter's canal. The aneurysm was about the size of a walnut, it prevented expansile pulsation and bruit. There was no interference with the circulation of the leg. On pressing the femoral artery the pulsation ceased, and the

swelling almost disappeared. Patient was operated upon. A vertical incision was made about 3 inches long over the line of the artery in Hunter's canal. It was found that the bullet had injured both the artery and vein, and had produced an arterio-venous aneurysm of the superficial femoral artery. The whole sac was excised, and a distal and proximal ligature applied. The wound was sewn up and healed by first intention. The patient completely recovered.

Case 3 (operation by Mr. Stonham).—Almost at the same time there was admitted to the hospital a second cause of traumatic femoral arterio-venous aneurysm. It presented features almost identical with the above, and the same method of treatment was adopted. The wound healed well, and within a few days the circulation in the leg was perfectly restored.

There is no comment to be made on these cases, the operation of excision in each case was attended with the very best result.

Gunshot Wounds Involving Injury to Nerves.

A number of cases of bullet wounds admitted showed some injury to the nerve or nerves in the region of the wound. In the slighter cases patients complained, sometimes for months afterwards, of weakness and pain in the part affected, although it was very difficult to say what was the nature of the nerve lesion. In some cases whilst the patients were lying in bed waiting for a simple bullet wound to heal, they complained of irregular pains, which were very troublesome. It is probable in some of the cases that there was a strong element of neurosis. In some cases the lesion was quite clear and the treatment was plainly indicated, but in others it was only by waiting, and watching the case for some weeks, that a true opinion could be arrived at. Generally speaking, it may be said that when in doubt the right thing to do is to pursue an expectant treatment. In this way the patient may be saved an unnecessary operation, whilst, on the other hand, no harm is done by delay. Several cases illustrating the various kinds of nerve injury met with are worth describing.

Case 1.—An Officer in the 8th Hussars was wounded by a Mauser bullet while on convoy duty. The bullet passed from before backwards through the axilla, just missing the third part of the axillary artery on the left side. He was admitted to hospital two or three days afterwards. On admission, his wound was found to be healed, the wounds of entry and exit being quite small. He was suffering from wrist-drop, with complete loss of power in all his fingers; he had also loss of flexion and extension at the elbow joint, and some loss of sensation over the area supplied by the ulnar nerve; this was still more marked over the area of distribution of the branches of the musculo-spiral. His main trouble at this time was agonising pain in connection with the parts supplied by the radial nerve, especially the radial side of the thumb and first finger. This pain was very little relieved by morphia in ordinary doses. For this reason it was decided, after a week, to perform an exploratory operation, and stretch the nerves, in the hope of affording relief from his great pain. An exploratory operation was done, and it was found that no nerve was divided; the nerves surrounding the third part of the axillary artery were well stretched, a drainage tube was inserted, and the rest of the wound closed. His pain was at once very considerably relieved by the operation, although a burning sensation still persisted. Unfortunately the wound suppurated very acutely, and counter openings had to be made. The axilla was

thoroughly drained and irrigated for some weeks before the wound closed. The patient was then sent home. Before leaving hospital, he showed a certain amount of returning sensation and some movement in his fingers, though the arm was still quite useless. The pain had very nearly gone. Six months after the injury the condition was still, but very slowly, improving.

The following case illustrates well the severe pain which is felt in some of these cases, although no gross lesion can be found to account for it :—

Case 2.—An officer was admitted who had been shot through the arm almost at the level of the axilla. Both wounds were suppurating slightly; the bone and blood-vessels were uninjured. There was no paralysis, but severe pain and burning sensation was experienced in the course of distribution of the radial nerve. The pain became so severe that the patient begged for operation, but previous experience had shown us that very little good is likely to result from such measures. Local applications for the relief of the pain were tried, and finally the patient was sent away for a change of air. We heard subsequently that he had been operated upon, and, presumably, the nerve stretched, but without good results.

These two cases illustrate several points with regard to nerve injuries. Both cases were operated upon, and in neither case was any macroscopic lesion discovered, so that we are driven to explain the symptoms by calling these cases of 'nerve concussion,' whatever that may mean. There was no evidence of contusion or of inflammation of the nerves. Possibly microscopically small hæmorrhages and some signs of degeneration might have been found. It is difficult to believe that the effects of concussion unless followed by secondary changes can last so long as in these cases, and yet no gross injury could be seen at the time of operation, and there was no evidence of progressive nerve lesion afterwards.

Another interesting symptom in both these cases was the presence of almost unbearable pain, which in neither case yielded to ordinary doses of morphia, or local anodynes. Reviewing all the cases of nerve injury which came under our care, some with complete division, some with lacerations, some in which the nerve was bound down by fibrous tissue or callus, we can form no conclusions which justify us in associating this severe pain with any particular class of injury.

Unfortunately we can only describe the cases up to the time they passed out of our hands. The most interesting part of these cases is the final result, and that is unknown to us.

Case 3.—A Private was admitted to hospital suffering from a gunshot wound of the left arm; the bullet had passed through the soft parts of the arm immediately behind the humerus, just below the situation of the musculo-spiral groove. Both wounds of exit and entrance had healed before his admission. He suffered from wrist-drop and complete paralysis of all the muscles supplied by the musculo-spiral nerve below the seat of the wound. In addition to this there was loss of sensation in the parts supplied by the radial nerve. He suffered no pain whatever. Some thickening could be felt behind the humerus, at the site of the wound; this was not tender when pressed upon. The nerve was thought to have been divided, and that probably the swelling felt

behind the humerus was the bulbous extremity. An incision was made, and the nerve discovered in the musculo-spiral groove tightly bound down by a mass of fibrous tissue and callus. The bullet had grooved the bone without actually fracturing it, and, at the seat of the injury, new bone had been thrown out. The nerve was carefully dissected out from this mass, and the wound closed. Healing occurred by the first intention. A month later sensation was fully restored over the whole of the arm, the patient was able to extend some of his fingers, and was still improving.

It is interesting to contrast with this a second case, admitted some little time afterwards. The wound was in almost the same situation, and the symptoms presented were almost identical. When, however, the incision was made, the nerve was found to be completely divided, and the ends were found to be lying at a distance of about an inch from one another. They were brought together, the bulbous portion cut away, and the ends united with chromic cat-gut sutures. The wound healed by first intention. A month later we thought that there was some return of sensation, but there was no return of movement.

Case 4.—A Trooper in the Yeomanry was shot by a Mauser bullet in the right thigh. The bullet passed behind the femur from side to side at about the junction of the lower and middle thirds. The patient was not admitted to the Yeomanry Hospital until about six weeks after the accident On admission he had a discharging sinus running from one side of the thigh to the other. In addition to this he had symptoms of division of his external popliteal nerve. This is to say, ankle-drop, loss of flexion at the ankle joint, and anæsthesia over the area supplied by the musculo-cutaneous nerve. The sinus healed up four weeks after admission to hospital, and it was then decided to operate for the nerve injury. An incision was made over the upper end of the popliteal space. The external popliteal nerve was found to be partly divided and partly bound down to the back of the femur by firm fibrous tissue. The upper divided portion had a bulbous extremity. The nerve was freed from the tissue binding it, and the divided ends refreshed and sutured. About a month after the operation the patient was invalided home. He showed very little improvement at the time of leaving the hospital.

Gunshot Wounds of Abdomen.

Several cases in which abdominal wounds have occurred are included under other headings. But, as would be expected from the situation of the injuries, the number of uncomplicated abdominal cases which reached us was small. For in wounds of this nature either a fatal termination is likely to rapidly ensue, or the importance of keeping the patient absolutely at rest is so great that only in cases of direst necessity are they moved from the Field Hospitals. Nevertheless, from time to time a few cases came into our hands. Such as we saw led us entirely to agree with those surgeons who teach that only a small percentage of cases of abdominal wounds are likely to be benefited by operation; and that two points are of great importance in the immediate treatment, (1) that the patient shall undergo as little movement as possible, (2) that food shall not be given by the mouth. In none of the patients whom we saw was operation indicated.

The following cases present points of interest:—

Case 1.—Lieut. S., of the Camerons, was wounded by a Mauser bullet which entered on the right side of the abdomen two inches below the costal margin. It passed completely through

the abdomen and emerged to the right of the spine at a rather higher level. From the situation of the wounds it seemed almost certain that both the liver and the stomach must have been injured. The patient lay upon the ground for twenty-four hours before help reached him, and during this time had no food or drink. After he was picked up he managed to obtain eight water-bottles full of water, the whole of the contents of which he drank. In spite of this he made a good recovery.

Case 2.—A patient was admitted with a wound in the region of the right iliac fossa inflicted by a Mauser bullet. The bullet had entered about the middle point of a line drawn from the anterior superior spine of the ilium to the umbilicus. It had passed almost horizontally through the body and emerged in the flank. A fæcal fistula was present in front and a second one behind, and from these openings the intestinal contents were oozing. The bullet must have passed completely through the cæcum. The patient's general condition was much better than might have been expected, and at no time were symptoms present which led us to believe that general peritonitis had occurred. For a time he was fed entirely by the rectum, and both wounds were irrigated thoroughly three times a day with weak antiseptic solutions. The wound in front gradually closed, and when last seen the wound behind had become much smaller and the escape of intestinal contents almost ceased.

Wound of the Perineum.—

Case 3.—A Bushman was wounded at Rhenoster Kop by a Mauser bullet, which passed horizontally from one side of the body to the other. Taking a straight line between the wounds of entry and exit, the bullet must have passed through the perineum near the bulb of the urethra. When admitted the day after his injury was received, the patient could not empty his bladder. He stated that he had been able to pass urine immediately after his injury, but only with great straining. It was necessary to employ a catheter regularly for a few days, after this micturition was naturally performed. There was never any bruising or swelling to be seen in the perineum nor any sign of extravasation of urine, although some tenderness was complained of. After a few days in bed he went back to duty perfectly well. In this case the bullet had missed the bones and great vessels of the thigh on either side. The uretha, almost certainly, was not touched, the retention of urine being probably due to inflammation in the track of the bullet.

Case 4.—A fatal case of penetrating wound of the abdomen was the one (already described under gunshot wounds of spine) in which the spleen was perforated. In this case the abdominal injury apart from the spinal trouble was sufficient to cause death; and it is surprising that the patient lived so long as he did. The abdominal symptoms were very vague, and no definite injury to any particular viscus was diagnosed during life.

There were several instances in which it was doubtful whether the bullet had or had not penetrated the abdominal wall. In these cases a varying amount of rigidity of the wall with pain, tenderness, slightly raised temperature and a rapid pulse (running up sometimes to 130) gave rise, for some days, to anxiety. In these cases if the wound was a penetrating one (and it probably was in the more marked cases) the absence of any definite localising symptoms and the speedy recovery, made it almost certain that no damage to any important viscus had been inflicted.

Case 5.—A Mauser bullet wound inflicted at Rhenoster Kop. The bullet entered on the right side about 2 inches above Poupart's ligament and 1 inch to the inner side of the anterior

superior spine of the ilium. The wound of exit was situated just below and external to the spine of the pubes on the same side. The patient had severe pain on admission, and the lower part of his abdomen was rather rigid. The wounds were suppurating, and the evening temperature rose to 100° for several nights. The pulse rate however was never higher than 100 per minute. There was swelling and induration in the region of the track of the bullet, and the glands in the right groin were enlarged. The patient was not able to get up for some weeks; but returned to duty eventually. In this case the bullet may have actually entered the abdominal cavity, but severe bruising of the abdominal wall would account for all the symptoms, and the low pulse rate supports this view.

Appendicitis.

Cases of appendicitis were not infrequent among the troops in South Africa. In this hospital during the period we are considering eight cases were admitted. Most of these cases came under the heading of 'recurrent attacks without suppuration.' There were one or two with abscesses, but no case of the acute fulminating form came under our observation. In addition to these, but not diagnosed definitely as appendicitis, there were several cases with marked abdominal symptoms, great pain, raised temperature, and rapid pulse; these were probably appendicitis, but the localising symptoms were indefinite. Three cases were operated on.

Case 1.—Pte. G. was admitted suffering from a typical attack of appendicitis. He stated that he had been acting as an officer's servant, and had had usually two or three slight attacks of pain weekly for the last three months, so that he could never depend on being able to do his work. He also stated that he had 'nearly died' in India from a similar thing; he was then in bed for four months with a large lump in his abdomen. His appendix was removed. It was found to be diseased. He was sent down to the base about a month after the operation, but wrote to say that the authorities were sending him back to the front again.

Case 2.—Trooper C., Kitchener's Horse, was admitted suffering from appendicitis of the recurrent type. He had had three attacks before. He was kept in bed for three weeks, as he had pain in the abdomen and his temperature was slightly raised. About a month after admission his temperature had fallen, and the pain and tenderness had left him. The appendix was excised; it contained a passion fruit seed, and was inflamed and swollen. The wound suppurated. Possibly the operation had stirred up again the recent inflammation. Patient did well, and was discharged to duty.

Case 3.—An Officer, aged 50. On three occasions within the previous four months he had suffered from attacks of abdominal pain. These attacks of pain had been accompanied by constipation, distension of the abdomen, and vomiting. The pain in the last attack had been chiefly localised in the right iliac fossa, and this region had been very tender to the touch. The symptoms pointed to appendicitis, and the nature of the patient's duties rendered it dangerous for him to run the risk of another attack. On admission there was some resistance to be felt in the right iliac fossa, but no definite tumour. At the operation a great many adhesions were encountered in the region of the iliac fossa, and considerable difficulty was experienced in finding the appendix. At length it was discovered, very much enlarged and thickened, hanging over the brim of the pelvis and adherent to the rectum. Very cautiously the whole of the adhesions were

separated by the finger, a task of considerable difficulty. There was a good deal of oozing, and once or twice temporary plugging had to be applied. The appendix was removed. A Keith's drainage-tube was left in the cavity from which the appendix had been removed; for the first twelve hours this was sucked out every four hours, and subsequently every six. At first there was free oozing, but this gradually ceased. The tube was left in for forty-eight hours and then removed. The patient made an excellent recovery.

Hernia.

Thirty-one cases of hernia were admitted, nearly all of them of the inguinal variety. We never saw a case of strangulation. It was difficult to know what to do for these patients. On a number of them we performed radical cure. At the end of six weeks they were given light duty as orderlies in the hospital. At the end of three months they were fit for ordinary duty. In this way we were able to watch their progress for three months. One case was sent to the base at the end of that period, as he was in our opinion physically unfit for active service. He was sent back by the authorities to the front. Some who declined operation were fitted with trusses and sent to garrison duty, while a few who could not wear a truss or were in other ways unfitted were sent to the base to be invalided home. Among the cases operated on there were two cases of interstitial hernia. All the cases did well, none having to wear a truss after operation. The method adopted was in every instance a modification of Bassini's operation. All were quite sound and strong at the end of three months; and several whom we saw after six months' service in the field, had no return of the rupture.

Rectal Diseases.

Some of the cases of hæmorrhoids were very severe and accompanied by a considerable amount of ulceration. As a rule, if a patient, who was a suitable case, asked to be operated upon, his request was complied with, if there were spare beds in the hospital.

Thirty-two cases of hæmorrhoids, ten cases of fistula *in ano*, and one case of anal fissure were admitted.

Trooper H., Imperial Yeomanry, was admitted to the hospital suffering from a slight attack of 'dysentery' and from hæmorrhoids. After remaining in hospital for a fortnight, and having completely recovered his general health, the hæmorrhoids, which were very troublesome, were operated upon. After the operation his temperature remained normal for about a week, then began to rise. Pain and tenderness developed in the region of his liver. Suppuration occurred at the seat of operation. The temperature varied for the next six weeks between 101° and 103°. The patient became very thin, and had a yellow tinge, though he was not deeply jaundiced. The pain and tenderness over the liver continued. He was examined carefully at intervals, but no

signs of any liver enlargement could be detected. He was sent down to the base. Definite signs of a liver abscess eventually appeared, this was opened and drained. The patient was eventually sent home to England.

Most of the cases of liver abscess following African dysentery have been multiple. It is probable that this abscess was not dysenteric, but followed the operation for hæmorrhoids. It is a very rare complication, and is worth recording for this reason.

We were frequently asked to operate for hæmorrhoids in patients who had recently suffered from dysentery. This was the only case in which we did so.

Veldt Sores.

This condition was one of the commonest we were called upon to treat. Fifty-one patients were admitted for this alone, and in addition to these many who came under our care with other complaints suffered from veldt sores also. The disease was a new one to us, and as far as we are aware, although many theories exist, its pathology has not yet been worked out.

When seen in an early form, each veldt sore consists of a small bulla containing clear fluid; this enlarges and the fluid becomes purulent. The pustule bursts and discharges, a small round ulcer being left. The skin round this ulcer is dead white, sodden, and undermined. It rapidly undergoes necrosis, and in this way the ulcer spreads. At the same time it deepens by a similar process, though rarely to such an extent that bone, tendons, or other underlying structures are exposed. The ulcer is usually circular in form, with undermined edges and a sloughy base, resembling very much the rupeal ulcers seen in severe cases of secondary syphilis. The commonest situations for veldt sores are undoubtedly the hands and the legs, but they may occur in any part of the body. It is not at all uncommon to find them on the buttocks. We have seen them on the septum and turbinate bones of the nose, and underneath the nail of the great toe. The face, too, is frequently affected.

The lymphatic glands are usually enlarged and tender, and in some cases severe lymphangitis and even cellulitis are met with. Thus an officer (Lieutenant C., of Roberts' Horse) was admitted with veldt sores of the left hand. The whole hand was very painful, much swollen and inflamed. The superficial lymphatics of the arm were marked out along their whole extent as deep red streaks, and the axillary lymphatic glands were much enlarged, very tender and painful. The temperature was 102°. The hand and arm were treated by means of antiseptic baths for four hours daily. Glycerine and belladonna were applied to the arm and axilla, and fomentations to the hand in the intervals between the

baths. The inflammation subsided without any operative treatment. The glands in the axilla did not suppurate.

An unusual complication is thrombosis of the veins. We have seen one such case. A trooper was admitted with veldt sores of the hand. When he had been in hospital for a few days he complained of pain and stiffness of the arm, and on examination the cephalic vein was felt to be thrombosed for nearly the whole extent of its course.

The pathology of the disease, as we stated before, has not yet been satisfactorily worked out. Many points about it indicate a microbic origin. There is no doubt that other factors play a very important part in its causation. One of these is a lack of fresh fruits and vegetables in the diet. Thus an artillery officer informed us that on one particular trek in which the men's food consisted almost entirely of bully beef and biscuits, almost every man in his battery became infected with veldt sores. When however they came into the Rustenburg Valley, and the men were able to obtain oranges and fresh vegetables, the sores healed very quickly. It has been stated recently in one of the medical journals, that the disease is almost confined to those whose duties frequently bring them into contact with horses. This has not been our experience. In our patients, veldt sores were as common amongst the infantry as amongst mounted men. The disease does not appear to be contagious, for amongst the medical men, sisters, and orderlies who were constantly dealing with and dressing these patients in hospital no single case occurred.

The treatment adopted we varied from time to time. The constitutional treatment was undoubtedly as important as the local. The constitutional treatment consisted of rest, a good diet with fruits and fresh vegetables. In addition, a tonic was usually given. The local treatment adopted was at first fomentations until the surrounding inflammation had subsided and the ulcer was looking clean; then in the latter stages various antiseptic dressings were adopted—one very frequently used was plain gauze wrung out of one-in-a-thousand biniodide lotion. The ordinary lotion nigra, too, was found to answer admirably in some cases. Under this treatment in most cases the ulcers quickly healed, but in some more active measures had to be adopted, such as touching them over with pure carbolic acid or scraping with a Volkmann's spoon.

Sometimes the base of the ulcer became covered with large and exuberant granulations — as in the case of an artillery officer (Lieut. J.). This patient had two veldt sores situated on the cheek; each was the size of a five-shilling piece. When first seen, the bases were covered with a mass of granulation tissue which was raised for fully half an inch. The ulcers were scraped with a Volkmann's spoon so as to remove all the granulation tissue, and then painted

over with pure carbolic acid. The latter part of the treatment had to be repeated two or three times before proper healing took place.

Another noticeable feature of the veldt sores was the tendency they showed to break down again after they had once healed. It was by no means an uncommon thing for a patient to be sent back to duty, only to be readmitted to the hospital a week or two later.

Tumours.

As might have been expected, we saw very few new growths. In addition to these cases mentioned below we saw a civilian in the Intelligence Department who had a huge mass of glands in the neck, secondary to an epithelioma of the soft palate quite beyond any operation. We also saw cases of multiple fibro-lipomata, multiple sebaceous cysts, a case of symmetrical encysted hydrocele of the cord, &c.

Case 1.—A Trooper of the Imperial Yeomanry was admitted to the hospital, suffering from a tumour of the thigh. He gave the following history:—Five weeks previously he was kicked by a horse upon the spot where the tumour had since developed. He felt considerable pain at the moment, but in a few minutes he was able to mount his horse and ride to camp. For the next few days he suffered pain, but continued on duty, and was able to mount and dismount without assistance. A fortnight later he noticed a swelling situated on the front of the thigh, and consulted his regimental surgeon. A month from the date of the accident, as the swelling was increasing in size, he was recommended to come into hospital. This he did a fortnight later.

On admission to hospital there was a tumour about the size of a cocoanut, situated on the anterior aspect of the left thigh, almost midway between the groin and the knee. The swelling was situated beneath the muscles, and was firmly attached to the femur. It was very hard, so hard in places as to suggest that it consisted partially of bone. There was no pain on manipulation. There was no eversion or shortening of the leg. No enlarged glands could be felt in the groin, and the patient was only slightly lame. The temperature was normal. The case was regarded as one of chronic periostitis of the femur, or as a sarcoma. This case was seen by Mr. Stonham and several other surgeons. After a few days in bed the swelling became softer in one part, and we thought we could detect fluctuation. It was decided to make an exploratory incision to ascertain its nature. An incision was made through the muscles on the outer side of the thigh, and when the tumour was incised a quantity of clear synovial fluid escaped. When the finger was introduced a transverse fracture of the middle of the femur was discovered. A complete false joint had already formed. A quantity of callus was thrown out round each end of the bone. The ends of the bone were ground together, and a long Liston's splint applied. The wound healed by the first intention, and in the course of five or six weeks firm, bony union was established.

Case 2.—A Trooper in the Yeomanry was admitted into hospital, suffering from a swelling of the left breast. He gave a history of having first noticed the swelling eight months previously, and stated that during the last four weeks it had grown rapidly, and become very painful. On examination a tumour was discovered almost the size of a goose's egg. The swelling was hard, and moved freely on the pectoral muscles. The skin over it was not adherent; it did not appear to be encapsuled; the glands in the axilla were not enlarged. Some doubt was entertained as to

the nature of the tumour, and it was decided to amputate the breast. This was done, and it was found quite easy to separate the tumour from adjacent structures. On microscopic examination the growth was found to be a fibro-adenoma.

Case 3.—An Officer was admitted suffering from an ulcer on the lip. This had been present for six months. The diagnosis of epithelioma had been made, and he was sent in with a view to operation. The ulcer was nowhere deep; it had a sloughy base, with hard and everted edges. An enlarged and rather tender gland could be felt in the submaxillary region, but none at the angle of the jaw. A small piece of the edge was removed for microscopic examination, but no evidence of malignant disease was found. Under treatment by simple methods the ulcer completely healed.

Severe Septic Cases.

The two following cases occurred amongst our own orderlies:—

Case 1.—Pte. B., whilst walking across the camp one afternoon suddenly felt sick and giddy, and fell down; he was taken to his tent and subsequently transferred to hospital. Almost immediately after admission he had a severe rigor, lasting for several minutes, and followed by a temperature of 104°. The case was thought to be probably one of insolation, and was treated as such, but the temperature remained high, and the rigors recurred from time to time. For the first three days no physical signs of any kind could be discovered, but at the end of that time a brawny induration appeared over the right clavicle, and gradually spread downwards. At the same time the axillary glands became much enlarged. Incisions were made, but only brawny indurated tissue was encountered; no pus was discovered. Free incisions were then made above the clavicle and through the pectoralis muscle. For a time the temperature came down, but rose again, and the patient died two days later. Post-mortem: Beyond the induration mentioned above, no lesions of any organ were discovered. The seat or cause of the infection was never found.

Case 2.—Serg. G., of the hospital staff, was admitted into hospital with a sore on the sole of his left foot, and with an acute cellulo-cutaneous erysipelas of the foot and leg. The history was that he had had a suppurating corn, which he had cut with his razor four or five days before. He had not been in very good health for some weeks. As the swelling of the foot and leg was very tense and brawny, incisions were made. At the same time pus was let out from the suppurating corn on the foot. In spite of this he gradually sank, and died on the eighth day.

Case 3.—A Private of the Lincoln Regiment was admitted into hospital suffering from a lacerated wound of the knee. He was one of the regimental orderlies, and had been told to burn rubbish contained in a tub. As soon as this was placed on the fire, an explosion took place. It afterwards transpired that the tub contained a box of cartridges, and that when they were ignited the tub was blown to pieces, and part of the iron hooping with which it was bound inflicted the wound. After careful examination, it was thought that the wound was not a penetrating one of the joint. It was carefully cleansed, and the leg put on a back splint. In the course of twenty-four hours, however, the wound became swollen, painful, and inflamed, and the leg œdematous. An anæsthetic was given, and the wound freely opened by incisions on either side of the patella; a quantity of turbid serum was let out, and on introducing the finger a piece of iron hooping was discovered lying in the joint. The joint was freely drained, and thoroughly irrigated with 1 in 4000 biniodide of mercury solution. This irrigation was subsequently performed three times a day. In spite of this, pus tracked both upwards and downwards, and incisions had to be made on two occasions. The patient lived for five days after the first operation, and died of septic poisoning.

Venereal Disease.

Fifty-eight cases of venereal disease were treated in the hospital; of these thirty-eight were cases of gonorrhœa and twenty were cases of syphilis. Thirty-one cases of gonorrhœa were returned to duty, and seven were invalided to the base. Eighteen cases of syphilis were invalided to the base, one died, and one was returned to duty.

Gonorrhœa.—The incidence table shows that twenty-four cases out of the thirty-eight were admitted during the month of April. These cases, almost without exception, occurred in a draft of men who had recently come out from home, and the disease was contracted either in London immediately before starting or in Cape Town. From the seven cases admitted in March the same history was obtained. It was a very unusual thing to find that venereal disease was contracted whilst on active service. Upon the whole, complications were rare, although it was necessary for various reasons to invalid seven cases to the base. Amongst these were cases of gonorrhœal rheumatism, severe cystitis, and chronic orchitis.

Balanitis both of venereal and of simple origin was common, and in several cases circumcision had to be performed.

Nearly all cases were treated both locally and generally. Generally by means of rest, light diet, total abstention from alcohol, and doses of magnesium sulphate; locally by the injection of solutions of such substances as zinc sulphate or sulpho-carbolate and perchloride of mercury.

Syphilis.—We admitted twenty cases, almost all contracted in England. These cases represented every stage of the disease, from the primary sore to late tertiary manifestations. The majority of these cases were invalided to the base. The following case is of interest: —

A patient about whom we could obtain no history was admitted from Middelburg. He was in a half-conscious condition, and quite unable to speak. He showed no signs of understanding anything that was said to him. His pulse was slow, of full volume, and the temperature was not raised. The eyes and head were turned to the right, the pupils were equal, and reacted to light and accommodation. There was marked paralysis of the right side of the face, the right arm and leg, and paresis of the left arm and left leg. The knee-jerks were exaggerated, and there was incontinence of urine and fæces. We could not ascertain whether there was any paralysis of the ocular muscles, and as far as we could judge sensation was not affected. Well-marked optic neuritis was present in both discs. He was able to swallow, though with some difficulty, fluids placed in his mouth, and, so long as nourishment was given in small quantities only, he did not vomit. There were extensive bed-sores over the back and buttocks, but no scars of old syphilitic lesions could be discovered on the legs or elsewhere. Nevertheless the case was regarded as one of syphilis, and large doses of iodide of potassium were administered. No improvement, however, took place, and ten days later the patient died. Post-mortem: A large gumma was found

occupying most of the motor area on the left side of the brain. There was also extensive arteritis and thickening of the cerebral arteries at the base of the brain, particularly about the circle of Willis.

Dental Caries.

Forty-one cases were admitted to the surgical side for this condition. This does not represent the total number, as there were many admissions on the medical side for digestive disturbance, which were found to depend upon this cause. In only a few cases did the patients complain of toothache; in the great majority the trouble which brought them to the hospital was indigestion.

The great cause of the decay of the teeth was undoubtedly the nature of the food which the men were obliged to eat. The ration biscuit, unless soaked, is a trying diet for even sound teeth, and to those in which the germs of decay are already there it is particularly fatal. But in addition to this there were other causes at work. Civilians who have been living in Africa for some time, and dentists who are practising there, have told us that in time of peace, and when all ordinary foods are available, early decay of the teeth is very common. They attribute this, whether rightly or wrongly we do not know, to some defective or destructive quality in the water. Another cause of decay was the very slight care which the men bestowed upon their teeth. On inquiry we discovered that very few of them when in Africa brushed their teeth, and even the most ordinary precautions for preserving them were neglected.

In a few cases dental abscesses requiring operation were present, but the usual symptoms complained of were pain after food and a gradual loss of strength, sometimes accompanied by general debility and anæmia. It was no uncommon thing on examining these patients to find hardly one sound tooth in the jaws. In the majority of cases the disease had originated in the country, but in some of the latter drafts of Yeomanry and of men who had been recruited for the irregular corps, sufficient care in recruiting could not have been paid to the condition of the teeth.

It was a difficult problem to know what was the best thing to do for these men. If the stumps were extracted, and they were returned to duty, in a very short time they were back in hospital. For some of them posts were found in the hospital, in offices, on garrison duty, or in other positions where soft food could be obtained; but in many cases, particularly amongst 'Section D' Reservists, it was thought advisable to invalid them to the base.

Eye Cases.

Among other general surgical diseases we had a considerable proportion of eye cases; conjunctivitis, iritis, lachrymal obstruction, and corneal ulcer were commonest. Pterygium, syphilitic panophthalmitis, and iritis, and one case of double optic atrophy following sunstroke, were also admitted. The most common condition was, as might be expected, conjunctivitis.

The notes of the case of the optic atrophy following sunstroke are as follows:—

The patient stated that during the voyage out he had a slight sunstroke through lying on deck in the sun. Some weeks afterwards his vision began to fail. He was admitted to this hospital two months after the first symptoms. At that time he could not count fingers held at a distance of two yards from his eyes. Both discs were very pale and the vessels small. No other evidence of disease in either eye could be discovered. There was no history of syphilis.

Surgical Complications occurring in Enteric Fever.

The surgical complications of enteric fever were, considering the large number of cases treated, very few. By far the commonest was thrombosis of the leg. The vein most commonly affected was the femoral, and the left more frequently than the right. It was not uncommon for both legs to be affected. The onset of this complication was usually in the third and fourth weeks of the disease. The signs were pain and tenderness in the région of Scarpa's triangle, with very frequently enlargement of the lymphatic glands in this neighbourbood, œdema of the leg, and the presence of a hard and tender cord in the region of the femoral veins. The recovery of these cases was slow, but the prognosis both to life and limb was good. In no case did embolism occur.

Another very common complication was otitis media. This occurred sometimes in the acute stages of the disease and sometimes in advanced convalescence. A rise of temperature usually took place, accompanied by pain in the ear and enlargement of the glands of the neck. Sometimes the inflammation subsided without perforation of the membrana tympani, but more commonly an abscess discharged through the membrane.

These cases were treated by irrigation of the ear with antiseptic fluids, and in some instances the perforation in the membrane healed, but this was not usually the case. One case only was operated upon. A patient in his sixth week, whose temperature had been normal for some time had a sudden rise of temperature, the temperature reaching 102°. A relapse was suspected. The next day the temperature reached 104° and was accompanied by violent pain in the

ear, enlargement of the glands of the neck and œdema over the mastoid. The tongue was dry and furred, the pulse was of poor volume and varied between 110 and 120 per minute. The diagnosis of mastoid abscess was made. A curved incision was made behind the ear, the mastoid antrum opened, and a quantity of carious bone removed. A drainage tube was passed through and brought out at the meatus in front, the temperature immediately fell, the symptoms were relieved, and the patient made a good recovery.

Two cases of gangrene of the leg dependent upon arteritis occurred. The notes of these cases are as follows:—

Case 1.—Lance-Corpl. M., of the Imperial Yeomanry, was admitted to hospital suffering from veldt sores on both legs and hands. He had been in hospital ten days when his temperature began to rise, and in course of time he developed a typical attack of enteric fever with characteristic spots, enlarged spleen, &c. His veldt sores at this time were healed. He was transferred to a medical ward. His illness was of a severe type, with constipation. The temperature varied between 101° and 103·8°. He did well until the eighteenth day of his illness when a further rise of temperature occurred. His pulse also which had not been above 100 rose to an average of 120 beats per minute. At this time he developed a rough cardiac murmur best heard at the apex. He had no murmur at the commencement of his illness, and stated that he had never had rheumatic fever. About the end of the fourth week there was a sudden fall of temperature accompanied by cold sweating, and it was noticed that his right foot and ankle had become dead white. No pulsation could be felt in the corresponding popliteal or femoral arteries. In three days a line of demarcation appeared reaching obliquely upwards nearly to the popliteal space behind. The gangrene was partly dry and partly moist. As the patient's general condition was very grave, but was gradually improving, it was decided to wait a little longer before amputating. The heart murmur remained very much the same in character throughout. The leg was amputated above the knee a week later, but he never rallied, and died two or three days afterwards in a septic condition, sloughing of the flaps having taken place. Post-mortem: there were signs of old endocarditis about the mitral valve. The arteries and veins of the right lower extremity were filled with ante-mortem clot up to the bifurcation of the aorta.

Case 2.—Pte. J. R. A., of the New Zealand Mounted Rifles, was admitted on December 31st suffering from enteric fever. At this time he was in the second week of his illness. The symptoms were very typical, with furred tongue, rose spots, enlarged spleen, and as was usual constipation. For a fortnight the disease ran a course of not unusual severity, and no complications occurred. At the end of the third week the right foot was noticed to be dead and white, and pulsation could not be felt in the posterior tibial artery. There was no pain; the foot was kept warm by wrapping it in cotton wool. Next day the foot was mottled and ecchymosed and had one or two large bullæ upon its dorsal surface; pulsation could be felt in the femoral but not in the popliteal artery. After waiting for a few days a definite line of demarcation appeared about three inches above the ankle, and it was decided to amputate a short distance below the tubercle of the tibia. The tissues cut through at the operation appeared to be in very fair condition, although hæmorrhage was not very free. The condition of the patient before operation was such as to cause grave anxiety, and it was only after considerable hesitation that the operation was undertaken; he stood it however very well, and the next day seemed brighter and better than for some days previously. Extensive sloughing of both flaps took place, and he gradually relapsed into a septic condition, and died five days later.

One case occurred of abscess of the lung following enteric. The details of the case are as follows:—

Case 3.—Trooper B. was admitted suffering from enteric fever. His disease followed the ordinary course and he had a relapse. About the ninth week he became convalescent. Shortly afterwards he began to complain of pain in the left side of his chest and difficulty in breathing. The temperature also began to rise and he had profuse sweating. An empyema of the left chest was diagnosed, as he had dulness, loss of vocal vibration and breath sounds. A rib was resected, and it was found that the lung was adherent to the pleura, and the finger passing into a cavity containing a quantity of pus and lung debris. Some of the wall of this cavity which was very friable came away on the examining finger, and on microscopical examination proved to be lung tissue. There was no doubt that an abscess had been opened in the lower lobe of the left lung. A tube was inserted and kept in for about two months. The patient eventually went home with the wound healed. There were scarcely any abnormal signs on that side of the chest when the patient left hospital.

Other minor complications which occurred were:—Two cases of parotid abscess, the infection doubtless tracking along the salivan ducts from the mouth. Three cases of perchondritis—two of them rib cartilages, one of the thyroid cartilage. In none of these cases could the typhoid bacillus be discovered in the pus. In addition to these, one case of appendicitis occurred in a convalescent enteric. It was a mild case, and operative treatment was not necessary.

X-Ray Work.

Of the very greatest assistance to us in our work was the X-ray apparatus kindly presented by Lord Iveagh on the closure of the Irish Hospital. This was installed in a convenient out-building, which had been used by the previous occupier of the house as a photographic studio. Mr. Hall-Edwards came up from Deelfontein, but unfortunately was recalled when he had been with us only a few days, so that we were not able to benefit from his advice and experience so much as we had hoped to do. Colonel Kilkelly had had previous experience of the work, and was good enough, not only frequently to take photographs for us, but also to give us such instruction as enabled us to acquire a knowledge of the technique. He also on several occasions localised bullets for us by means of the Mackenzie-Davidson apparatus.

We made almost constant use of this means of diagnosis, the majority of our cases of bullet wounds were submitted to it, and it was a very great convenience to be able to examine not only cases in which the bullets were *in situ*, but also cases of fracture in which the position of the fragments was doubtful.

On the closure of the Pretoria Hospital the apparatus was transferred to the Imperial Yeomanry Hospital at Elandsfontein.

IMPERIAL YEOMANRY HOSPITALS.

Statistics of the Surgical Cases Treated in the Imperial Yeomanry Hospital, Pretoria.

August 18th, 1900, *to September 30th*, 1901.

I.—GUNSHOT WOUNDS.

Head and neck				20	Extremities—		
Chest				17	(*b*) Lower:	Buttock	7
Spine				3		Hip	2
Abdomen				11		Thigh	43
Back				5		Knee	5
Extremities—						Leg	50
(*a*) Upper:	Shoulder			15		Ankle	1
	Upper arm			21		Foot	7
	Forearm			13			
	Hand			15	Total number		235

II.—CASES OTHER THAN GUNSHOT WOUNDS.

Septic Diseases—						Panophthalmitis		1
Erysipelas				1	Diseases of the Ear—			
Gangrene, after enteric fever				2	'Deafness'			17
and pyæmia				2	Otitis media (chronic)			31
Venereal Diseases—					Alimentary System—			
Gonorrhœa				49	Dental caries			78
Syphilis				26	Periostitis of jaw			2
Tumours—					Stomatitis			2
Dermoid cyst of tongue				1	Parotitis			1
Sebaceous cysts				4	Enlarged tonsils			2
papillomal				1	Tonsillitis			74
Fibro-adenoma of breast				1	Liver (abscess)			2
Cyst				1	Appendicitis			9
Epithelioma of palate				1	Peritonitis			1
Malformations and Deformities—					Perforated dysenteric ulcer			1
Hammer-toe				4	Hernia (inguinal)			50
Hallux valgus				3	Rectum—			
Talipes valgus				4	1. Hæmorrhoids			51
Diseases of the Eye—					2. Fistula			14
Blepharitis				1	3. Anal abscess			2
Lachrymal obstruction				1	4. Anal fissure			1
Lachrymal abscess				1	Respiratory System—			
Conjunctivitis				15	Laryngitis			2
Keratitis				1	Abscess of lung (enteric fever)			1
Injury to cornea				1	Empyema (phthisis)			1
Corneal ulcer				1	Circulatory system—			
Pterygium				2	Varicose veins			26
Errors of refraction				23	Lymphatic System—			
Iritis				3	Adenitis and abscess			23

PRETORIA—SURGICAL DIVISION.

Diseases of Skin and Subcutaneous Tissues—	
Ulcers	12
Veldt sores	67
Snake bite	1
Cellulitis	36
Sore feet	11
Burns	4
Onyehia and ingrowing toe-nail ...	12
Abscesses and boils	53
Carbuncles	5
Diseases of the Urogenital System—	
Bilharzia hæmatobia	4
Bursitis and enlargement	6
Ganglion	2
Diseases of Bones—	
Periostitis	5
Necrosis	1
Fractures (simple)	40
Diseases and Injuries of Joints—	
Sprains...	43
Dislocations	7
Loose cartilage	7
Synovitis	51
Arthritis of hip (post enteric) ...	1

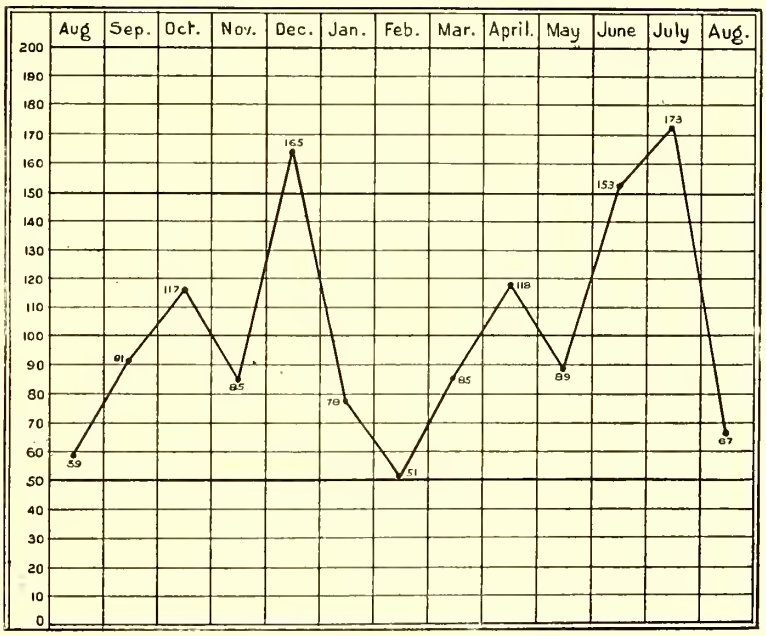


CHART SHOWING MONTHLY ADMISSIONS OF SURGICAL CASES.

Balanitis	3
Cystitis...	3
Hæmatocele	2
Hæmaturia	2
Hydrocele	7
Incontinence of urine	4
Orchitis	10
Phimosis	2
Stricture of urethra	11
Tuberculous testicle	1
Varicocele	36
Diseases of Tendons and Bursa—	
Tenosynovitis	1
Hæmarthrosis (hæmophilia)	1
Head Injuries—	
Concussion	7
Heat-stroke	1
Septic meningitis and extradural abscess (following kick from mule) ...	1
Injuries—	
Contusions	55
Punctured and incised wounds ...	15
Bayonet wounds	2
Total number of cases, excluding gunshot wounds...	1069

Total number of Surgical cases — 1304.

IMPERIAL YEOMANRY HOSPITALS.

Statistics of the Surgical Operations performed in the Imperial Yeomanry Hospital, Pretoria.

August 18*th*, 1900, *to September* 30*th*, 1901.

I.—OPERATIONS CONNECTED WITH GUNSHOT WOUNDS.

Amputations—	
Thigh	6
Leg	1
Arm	2
Forearm	2
Fingers	5
Resection of stumps	2
Removal of fragments of bone	11
Sequestrotomy	6
Resection of ribs	2
Astragalectomy	1
Extraction of bullets	11
Extraction of bullet from brain	1
Operations on nerves—	
Suture of (i.) great sciatic	1
(ii.) musculo-spiral	1
Nerve stretching—	
Musculo-spiral	1
Operations on arteries—	
Excision of femoral aneurysm (Hunter's canal)	2
Ligature, third part of right subelavian (axillary aneurysm)	1
Exploration of septic wounds	2
Total number of operations	58

II.—OPERATIONS NOT CONNECTED WITH GUNSHOT WOUNDS.

Operations on the eye—	
Canaliculus slit	1
Lachrymal abscess	1
Pterygium	2
Probing nasal duct	1
Operations on the vascular system—	
Ligature and excision of varicose veins	7
Operations on the lymphatic system ...	4
Operations on Bones—	
Incision for periostitis	2
Trephining. (i.) Mastoid	1
(ii.) Extradural abscess	1
Wiring fractured bones	2
For ununited fracture of the femur ...	1
Operations on joints—	
Arthrotomy (knee)	1
Aspiration (knee)	1
Removal of semilunar cartilage ...	1
Operations on bursa, fasciæ, and tendons—	
Incision of suppuration bursa patellæ	1
„ „ olecranon bursa	1
Dupuytren's contraction	2
Suture of tendons	2
Cyst in popliteal space	1
Evulsion of toe-nail	18
Operations on genito-urinary organs—	
Circumcision	8
Strictures dilated	8
Radical cure of hydrocele	2
Radical cure of varicocele	13
Sounding bladder for stone	3
Removal of tuberculous testicle ...	1
Operations on the alimentary canal—	
Removal of tonsils	5
Hepatotomy (abscess of liver) ...	1
Exploration of liver	1
Laparotomy for perforated dysenteric ulcer	1
Appendicitis:	
(i.) Laparatomy for suppurative appendicitis	1
(ii.) Appendicectomy	3
Rectum and anus:	
Anal fissure	1
Fistula in ano	17
Hæmorrhoids	29

PRETORIA—SURGICAL DIVISION.

Operations for Hernia:	
Radical cure of inguinal hernia ...	26
Tumours—	
Sebaceous cysts	3
Papilloma of lip	1
Papillomata of neck	1
Dermoid cyst of tongue	1
Fibro-adenoma of breast	1
Opening abscesses	21
Scraping ulcers	13
Incision for cellulitis	21
Carbuncle	1

Amputations—	
(i.) Leg (gangrene after enteric fever)	2
(ii.) Fingers	2
Resection of ribs (empyema)	2
Extraction of teeth under chloroform ...	18
Wrenching hip joint	1
Removal of wire from patella	1
Sequestrotomy	2
Exploration of septic compound fractures	3
Aspiration of chest	4
Total	269

I.—Total number of operations connected with gunshot wounds ...	58
II.— „ „ „ not connected with gunshot wounds ...	269
Combined total	327

SURGICAL REPORT.

By DOUGLAS DREW, B.S., F.R.C.S.

Senior Surgeon, Pretoria Yeomanry Hospital

From June to September, 1901.

Surgeon to the N.E. Hospital for Children.

In this Report the surgical work of the final stage of the hospital is dealt with. It includes a tabular statement of the cases under the following headings:—

1. Gunshot wounds.
2. General surgical cases (classified).
3. The operations performed.

A brief description is given of the gunshot wounds which presented unusual and interesting features and a few other cases of general surgical interest are noted. It is unnecessary for me to describe this surgical section of the hospital as I found it on my arrival at Pretoria in June, 1901, as it will be found in another section of the Report. I cannot, however, leave the subject without remarking on the excellence of the equipment and arrangements, and the smoothness of the working of this part of the hospital, which greatly facilitated my work in taking over the duties of Messrs. Douglas and Williamson on their return to England.

The number of cases of gunshot wounds treated during the period under notice (June to September) was necessarily somewhat limited, owing to the scattered nature of the fighting. Most of the cases received by us were transferred from hospitals at a distance, and did not arrive until some days after the infliction of the injury, so that the subsequent course of the wound, in many of the cases, was to a great extent predetermined before the cases came under our observation, and with the exception of the gunshot wounds of the lower limbs involving injury to the bone, most of which were suppurating, the wounds healed rapidly.

Another factor, which tended to limit the number of wounded received at the hospital, should be mentioned. A large number of the beds were constantly occupied by a continuous influx of unfit men, chiefly Yeomanry—many of whom were afflicted with some permanent disability such as dental deficiency,

deafness, &c., rendering them unfit for field service. Most of these cases occupied the beds of the hospital until invalided.

No death occurred on the surgical side during this period.

We were fortunate in possessing an excellent X-ray apparatus, and many excellent skiagraphs were obtained, which greatly assisted us, particularly in cases of fractures.

Injuries of the Head.

1. *Bullet Wound of the Brain (Motor area). Retention of Bullet. Successful Extraction.*—Lieut. —— arrived at the Imperial Yeomanry Hospital, Pretoria, August 5th, 1901, having been wounded in action five days previously. The wound of entrance was situated over the anterior part of the right parietal region about 2 inches from the middle line, it was an irregular slit in the scalp ¾ inch long and gaping to the extent of ⅓ inch; a small quantity of blood-stained serous fluid escaped. Behind the wound, was a large oval tense swelling beneath the scalp and some irregularity of the bone could be detected.

During the interval of five days before the patient came under my observation, the head had been dressed antiseptically. When the patient was hit, he was sitting with his elbows on his knees, having just fired his carbine, he was stunned, but not rendered completely unconscious. On admission, severe frontal headache was complained of, the mental condition was quite clear; the pulse was 50, regular, full, and incompressible, the respiration slow, sighing, and irregular. Temp. 99·4°. The pupils were equal, moderately dilated, and reacted but sluggishly to light.

There was partial paralysis of the upper part of the left side of the face, the angle of the mouth was completely paralysed, and the left arm below the shoulder was also completely paralysed, except for slight movement of extension at the elbow. There was subjective sensation of numbness in the forearm and hand, and some blunting of tactile sensation.

The head was at once shaved, disinfected, and skiagraphs were taken with exposures of fourteen and sixteen minutes respectively for the lateral and antero-posterior views, but unfortunately they did not give the least indication as to the position of the bullet.

In spite of the failure to locate the bullet, I decided not to delay the operation for the relief of the fracture, owing to the risk of the symptoms of compression which existed increasing, and while removing the embedded splinters of bone, I could explore the wound in the hope of finding the bullet. In this I was successful. Had I failed I should have relieved the existing compression, and could have waited without much anxiety until further skiagraphs, localising the bullet, had been prepared, when I could have performed a second operation for its removal.

The following is a brief account of the operation. The whole area of damage was exposed by turning down a large flap beginning in front at the margin of the hair, and ending posteriorly about two inches above and behind the mastoid. The fracture proved to be of the gutter variety (glancing impact); a number of fragments of the outer table were adherent to the flap and a small quantity of blood clot and broken-down brain substance was found beneath the flap; on removing this the outer table was seen to be splintered at the anterior part, while posteriorly the whole thickness of the bone had been ploughed up. The splintered fragments were removed and a large rent in the dura through which protruded brain substance was exposed, in which splinters were embedded. It was during the removal of the splinters that I touched metal, and on seizing this I withdrew the bullet: the projectile, which was embedded vertically, was split open from end to end, and a portion of the mantle was turned backwards and projected near the surface, and it was this projecting piece which I had touched.

After careful exploration to ensure that all embedded fragments of bone had been removed, the wound was closely sutured and dressing applied. There was considerable shock during the operation, but this rapidly passed off.

After History.—The convalescence was most satisfactory, at no time were there any symptoms to cause anxiety. The headache and facial paralysis subsided within twenty-four hours. On the fourth day the power of flexion at the elbow had returned; three days later the wrist could be extended, and on the eighth day flexion at the wrist was possible, then followed extension and flexion of the fingers—the movements of the thumb being the last to return.

On the fourteenth day the stitches were removed, and the wound was healed. The patient was kept in bed for three weeks; at the end of this period all but the finer movements of the hand could be performed, but they required considerable effort. When I last saw the patient, early in October, the improvement was marked, the grip of the left hand was strong and the execution of the more delicate and complex movements of the hand had to a great extent recovered.

2. *Temporary Blindness following a Scalp Wound in the R. Occipital Region.*—Lieut. —— was admitted three weeks after receiving the wound, which was healed. The bullet (Mauser) entered one inch to the right of the external occipital protuberance and ½ inch above the superior curved line, and emerged over the r. mastoid ½ inch below the level of entrance, the track being about 1½ inches long. When the patient came under my observation he complained of slight headache only. The interesting feature of the case was that of total blindness, persisting for six hours after recovery of consciousness. It was suggested that the bullet had penetrated the skull, but this, I think, is open to doubt, as from its situation the lateral sinus would almost certainly have been wounded; moreover no irregularity of the bone could be detected, and a skiagraph did not reveal any injury. In the absence of any fracture one can but conclude that the blindness was but a symptom of the concussion.

Wounds of the Chest.

Lieut. ——, in the Rifle Brigade. Wounded at Zandriverpoort, May 21st. Arrived at the hospital June 6th. The entrance wound was in the second left intercostal space 1¼ inches from the margin of the sternum, and the exit was 2 inches from the spine, and 1 inch below the twelfth left rib. At the time of the injury there was some external bleeding, but only slight hæmoptysis followed. On arrival at the hospital on the sixteenth day there was marked dyspnœa, and the pulse was 120 and temperature 101·4°. The wounds were covered by a scab. Respiratory movement was absent on the left side, which was dull all over except in the first and second spaces below the clavicle.

In order to relieve the distress and to determine if the contents of the pleura had become septic, aspiration was performed through the fifth space in the axilla, and 14 ozs. of dark-coloured blood were withdrawn, which proved to be sterile. In the course of the next fortnight the general condition improved and the temperature gradually subsided, but at the end of a month the signs in the chest remained much the same and the heart was still displaced; aspiration was again resorted to, and 47 ozs. of thick dark brown fluid were drawn off; this was followed by more rapid improvement.

This case presented several points of interest. From the course of the bullet it is difficult to explain how the heart escaped injury—possibly the ventricle was in systole at the moment of impact, and the fact that the patient was in a prone position at the time, which would tend to displace the heart slightly forward, must not be forgotten. We were unable to detect any signs indicating injury to the ventricular wall; which might possibly have occurred without a fatal result. In this connection it should be mentioned that the heart's action has remained persistently

rapid, and now, eight months after the injury, it varies between 90 and 100, and at times is irregular, and after exertion or excitement it often reaches 120. It has been suggested that this rapidity may be due to division of some of the inhibitory fibres of the vagus in the wall of the ventricle.

The injurious effect that early transport has upon the extension of hæmothorax has been pointed out by other observers. I am unable to state the influence of this factor in the early stages of this case, but the patient was very unfortunate in this respect, as he was moved several miles in an ambulance upon four separate occasions during the first fortnight before he was sent to Pretoria.

In another case, a private of the Rifle Brigade, who was received on the twelfth day after the injury, and in whom a slight hæmothorax was present, the temperature rose to 102° with pain and dyspnœa, suggesting that the journey was the immediate cause. In this case, as in the previous one, the question of sepsis of the pleural contents had to be considered; aspiration was not performed, and in a few days the temperature subsided, and the patient rapidly convalesced.

Abdominal Wounds.

Very few instances of this class were met with. In one case, which did not come under observation until a month after the injury, the bullet (Mauser) entered behind close to the spine on the right side, at the level of the eleventh dorsal spine, and emerged just below the seventh costal cartilage on the left side, so that it must have traversed the liver and walls of the stomach.

The only symptom complained of at this stage was pain after taking solid food.

Penetrating wound of the abdomen with fracture of the ilium and injury to the intestine (probably the cæcum).—In this case the bullet (Mauser) entered just internal to the right anterior superior iliac spine. It was probably of the expanding variety, in that it fragmented and caused three irregular wounds of exit in the right buttock from which fæcal matter was freely discharged. These wounds were enlarged to ensure drainage and irrigated at each dressing. At the end of three weeks the fæcal discharge had entirely ceased; a sinus, however, persisted, until a portion of the mantle of the bullet was found and removed, when it rapidly healed.

Another case is worthy of mention in that all important structures appeared to have escaped injury. The bullet (Mauser) entered the left thigh three inches below Poupart's ligament in a line with the anterior superior iliac spine, the limb being in a flexed position. The wound of exit was situated in the middle line over the lower part of the sacrum. The wounds healed *per primam*, and with the exception of troublesome stiffness in the thigh, no after effects could be detected.

Gunshot Wounds of the Lower Extremities.

Out of a total of thirty-one cases, no fewer than seventeen were simple flesh wounds, unaccompanied by injury to important structures. The majority of these healed rapidly. No cases of injury to the nerves were met with.

One case of injury to the femoral artery requires special mention, in that secondary hæmorrhage resulted, necessitating amputation.

The patient, a private in the K.R.R., was shot at a short range, and arrived at the hospital six days later. There had been severe primary hæmorrhage. There was a large rounded wound of entrance (probably Martini) below the middle of the thigh, towards the inner side, and a larger irregular wound of exit situated in the middle of the posterior surface of the thigh in the apex of the popliteal space. The thigh was infiltrated with pus and much swollen. Temp. 102–4°. The bone was not injured. Pulsation was present in the posterior tibial artery.

The wounds were explored and free drainage established. The femoral artery could be felt in the wound, but did not appear to be quite exposed. As a precautionary measure, an elastic tourniquet was placed around the limb in readiness. Four days later profuse hæmorrhage occurred (tenth day), necessitating transfusion with saline solution, before the amputation could be performed, through the middle of the thigh. The transfusion was again repeated after the operation, with great benefit. Owing to the septic condition of the limb some suppuration followed, but the patient made a good recovery. On dissecting the vessels, it was found that a small aneurysm had developed on the artery and had ruptured.

Compound Fractures.

The compound fractures of the bones of the limbs did not present any features of peculiar interest. In most of them there was extensive comminution, and the majority were septic upon arrival, and resulted in necrosis. No cases of injury to the large joints were met with.

Abscess of the Liver.

A case of abscess of the liver as a sequela to an attack of enteric fever, requires a few notes; as the condition is, I believe, very infrequent.

The patient, a sergeant in the A.S.C., had had two attacks of enteric in six months. There was extensive upward enlargement of the liver, but none could be detected in a downward direction. Aspiration through the sixth space in the mid-axillary line was performed, and pus was found at a depth of five inches from the surface. Two inches of the seventh rib were resected, and the pleura opened; the diaphragm was in close contact and very little air gained entrance. The diaphragm was sutured to the pleura, and the abscess evacuated through an incision in the diaphragm. The patient made an uninterrupted recovery (*vide* p. 190).

IMPERIAL YEOMANRY HOSPITAL, ELANDSFONTEIN.

MEDICAL REPORT.

By G. E. RICHMOND, B.A., B.Sc., M.B., B.S. (London).

Senior Physician.

Classification of Chief Diseases treated in Medical Division of this Hospital.

(*a*) *Digestive System.*—(1) Enteric Fever; (2) Dysentery; (3) Diseases of the Liver; (4) Tonsillitis; (5) Diarrhœa; (6) Appendicitis; (7) Dyspepsia.

(*b*) *Circulatory System.*—(1) Valvular Disease of the Heart (V.D.H.); (2) Service Heart (D.A.H.); (3) Anæmia.

(*c*) *Respiratory System.*—(1) Bronchitis; (2) Pneumonia; (3) Emphysema; (4) Pleurisy; (5) Tuberculosis of Lungs; (6) Asthma.

(*d*) *Nervous System.*—(1) Epilepsy; (2) Sunstroke; (3) Neuritis; Sciatica; (4) Delusional Insanity.

(*e*) *Excretory System.*—(1) Nephritis; (2) Floating Kidney; (3) Uræmia.

(*f*) *Special Senses.*—(1) Iritis; (2) Corneal Ulcers; (3) Keratitis; (4) Perforation of Membrana tympani.

(*g*) *Diseases of the Skin.*—(1) Psoriasis; (2) Eczema.

(*h*) *Diseases of the Joints.*—(1) Rheumatic Fever; (2) Rheumatism; (3) Dysenteric Arthritis.

(*i*) *Other Medical Diseases.*—(1) Malaria; (2) Bilharzia hæmatobia; (3) Tapeworm; (4) Influenza; (5) Debility; (6) Simple Continued Fever.

The Report of the Medical Cases.

In this report the foregoing classification will be adhered to, and remarks on any case of interest will be considered in their corresponding position. During the

latter half of the hospital's existence, the number of acute cases was so unusually high that it frequently became necessary to transfer patients before they had completely recovered to a large convaleseent camp attached.

(*a*) Digestive System.

The diseases of this class formed by far the most urgent and important section of the medical work performed at Elandsfontein, as can be gathered from the fact that all the eases that proved fatal and most of the dangerous eases belonged to the enteric and dysentery divisions.

(1) Enteric Fever.

Of the sixty-two cases of enteric fever admitted, thirty-six passed through an acute attack in the hospital, whilst the remainder were admitted either suffering from some sequela or as convaleseents from the disease.

These thirty-six cases fall into three divisions:—(*a*) Those which were very severe (about fourteen cases). (Owing either to the virulence of the infeetion, as evidenced by the presenee of high fever, acute delirium and failing pulse, or to the occurrence of some serious complication.) (*β*) Those which were unusually mild (eight cases). (*γ*) Those which were neither very severe or particularly mild (eight cases).

One or two cases suffered from malaria and enteric, and in some an attack of dysentery had preceded the attack of enteric.

(*a*) *Severe cases:*—

Trooper P. G., aged 23, admitted October 1st, may be mentioned as a type of a severe case of enteric fever. He suffered from epistaxis the day before admission, but for the next twelve days his temperature ranged between 99° in the morning to 100° or 101° at night. The spleen was palpable, but there was little else to point to enteric fever as a diagnosis until October 15th, when his temperature had risen by step-like rises to 104° F., and the usual signs of enteric appeared, with some slight bronchitis. From this time his condition became extremely critical. For eight days a high temperature (103°–105°) was maintained, the pulse became weak and rapid (120–144 per minute), the respirations were shallow and frequent (28–44 per minute), and some cyanosis occurred towards the end of this period. Delirium of a noisy, restless character was present, and for the whole period of eight days he was continually trying to get out of bed. There was a considerable amount of albumin present in the urine, roughly estimated at one-twentieth by the boiling test. Vomiting occurred for several days, although he was given weak albumin water and nutrient enemata. For two days he suffered from incontinence of urine and fæces, and just when the prognosis seemed to be quite hopeless, his condition suddenly improved. During convalescence he suffered from double pleurisy with effusion, and later on from an attack of dysentery, but he ultimately recovered, and was invalided to England.

(*β*) *Mild cases of Enteric.*—Eight out of the thirty-six eases were extremely mild; of these seven were not inoculated, and in one case it was not recorded

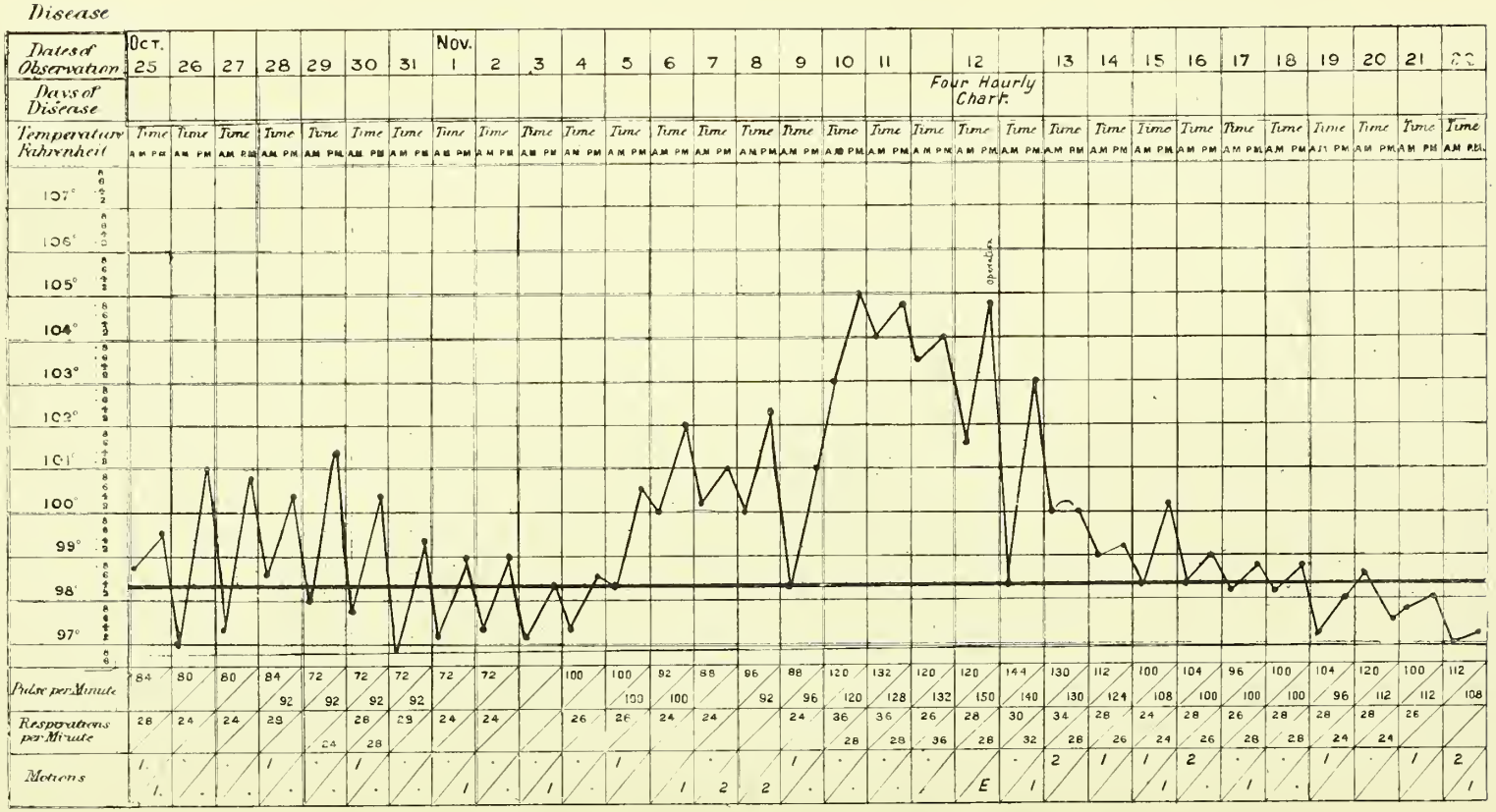
whether inoculation had taken place or not. In these cases the period of pyrexia was often very short, only fourteen days in two cases, and only lasting as long as twenty days in one case.

Since seven of these cases, or nearly twenty per cent. of the thirty-six cases of enteric, were not inoculated, they seem to the writer to point a serious objection to the contention that inoculation tends to diminish the virulence of the attack, which may be contracted by those who have been inoculated. Although the writer cannot refer to a record of any large number of statistics on inoculation during the twenty-two months that he has acted as medical officer to the Imperial Yeomanry Hospitals in South Africa, he has received an impression that inoculation and re-inoculation has done very little either to prevent incidence of the disease, or to mitigate the severity of an attack, or to prevent a fatal termination occurring.

Complications and Sequelæ of Enteric Fever.

1. *Meningitis. Death. Post-mortem.*—Trooper L., admitted November 8th, suffering from enteric fever, with a temperature of 104·8°, pulse 126, and rapid respirations. On admission there was slight delirium, and some rigidity of upper extremities was present. He suffered from a severe attack, with retention of urine. There was no otorrhœa. The temperature was maintained between 104° and 105° F. The delirium increased, and at times he tried to get out of bed. The rigidity noticed on admission increased during the five days he was in hospital; it was most marked on the left side. Opisthotonos was present at times, and convulsions occurred twice before death. Nothing was noticed abnormal about the reflexes. He was given hypodermic injections of liq. strychninæ, m/iii., three times a day in addition to other cardiac stimulants and brandy by the mouth. He became comatose before death, and suffered from incontinence of urine and fæces. At the autopsy. The spleen was enlarged, congested and softened. Numerous large recent typhoid ulcers were present in the small intestine. Kidneys were normal. *Brain:* Cerebral vessels engorged. The dura mater was adherent to the surface of the brain for an inch or an inch and a quarter on both sides of the sup. long. sinus. Slight curdy pus was found upon the surface of the brain beneath the arachnoid on both sides of superior long. sinus over an area one and a half inches long by one inch broad. The meningitis was strictly localised to the vertex of the brain, and did not extend into the sylvian fissures. Nothing abnormal was found in the brain itself. There is nothing known with regard to inoculation in this case.

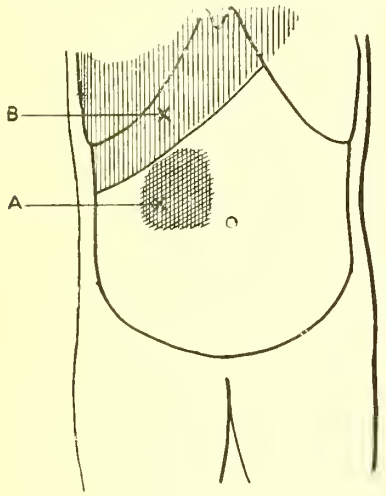
2. *Acute suppurative cholecystitis. Operation. Recovery.*—Trooper C., admitted September 15th, suffering from 'gastric catarrh,' pain after food, frequent vomiting, and constipation. Three years previously he had passed gall-stones. The liver was enlarged, and its edge could be felt two inches below the costal margin. An attack of enteric fever commenced on October 2nd, and proved a severe one, with four hæmorrhages of bright red blood from the bowel, the first two of which consisted of about a pint each. He also suffered from some hypostatic congestion of the lungs. The temperature had touched 97° on October 26th, but after this the temperature was intermittent for several days, rising to 101° in the evenings, and subsequently became normal for forty-eight hours. However, on November 5th the temperature began to rise again by step-like advances to 102° F., and it was feared a relapse had begun. Early in the morning of November 9th the patient complained of sudden intense abdominal pain, and the temperature fell from 102·4°



TEMPERATURE CHART OF CHOLECYSTITIS IN THE COURSE OF ENTERIC FEVER.

See page 255.

on the evening of the 8th to 96·4° on the morning of the 9th. The abdomen was somewhat rigid, and did not move well with respiration. The pulse was 88 per minute. The pain was treated with opium internally, and opium fomentations; some relief was given, but the pain still persisted. The temperature steadily rose on November 9th and 10th till it reached 105° F. on the evening of the latter date, and the pulse rate quickened to 120. During the next day the temperature was maintained between 104° and 105°, and the pulse became 130 per minute and more feeble. On examining the abdomen there was a sense of increased resistance, with an area of dulness situated on the right side above the level of the umbilicus and below the level of the liver dulness, which extended two and a half inches below the costal margin. There was a slight rigidity of all the abdominal muscles, but on the right side this was more pronounced, and especially so over the area mentioned above. It was thought that a thin line of resonance could be obtained between the liver dulness and the area in question—the abdomen did not move well with respiration. This condition remained practically the same on November 12th, with the exception that the pulse was becoming more feeble and more running in character, varying in rate from 120 to 140 per minute, and that the patient vomited once. It was thought that there might be a perforation, with localised peritonitis, and as the patient was becoming weaker it was decided to give him the chance of operation. At the time of operation the temperature was 104·8° F., the pulse 140 to 150, and respiration 30 per minute. At the operation no peritonitis was present, but the gall bladder was distended with about eight ounces of pus, and was full of gall-stones, which were mulberry shaped, soft, and crumbling, and ten of which were removed at the time of operation. As some of the purulent fluid escaped into the general peritoneal cavity, this was flushed out with hot boiled water. At times during the operation the patient's pulse was running and almost imperceptible, but he revived with two injections of liq. strychninæ, m/iii., and after the peritoneal cavity had been washed out with hot water. Several more gall-stones were removed at the first dressing, and the patient made an uninterrupted recovery, his temperature falling to normal on the fourth day after the operation. He was discharged to England with a biliary fistula. (*See* Chart on opposite page.)



A. Area of dulness, marked rigidity, and increased resistance.
B. Liver dulness.

(3) *Hæmorrhage* from the bowel occurred in four cases, and proved fatal in one instance, in which it recurred five times and in considerable amount. In two cases the hæmorrhage was slight, consisting of a few clots of blood and dark coloured motions. In the fourth case the hæmorrhage was severe, and recurred four times. Three of these hæmorrhages, the first two of which consisted of about a pint of bright red blood, occurred between 8.30 p.m. and midnight, but caused very little shock to the patient, whose temperature did not fall below 100·4°, and whose pulse did not quicken above 104 per minute.

Epistaxis is noted to have occurred in five cases respectively on the third, sixth, and seventeenth days of the disease, and in one case at two different periods,

viz., on the sixth and on the twenty-third and twenty-fourth days of the disease, the latter occurring during a relapse.

In one case a curious condition occurred which was thought to be a hæmorrhage into the subcutaneous tissues of the thigh. The case was as follows:—

Lieut. E. towards the end of a severe attack of enteric fever began to suffer from a high temperature of 105°, for which no cause could be found beyond the swelling of the right thigh. No pain was complained of, no œdema or discoloration of the skin occurred at any time, but the measurements of the right thigh showed an increase in circumference varying from a $\frac{1}{4}$-inch to $1\frac{3}{4}$ inches at different levels as compared with the left thigh. There was a sense of increased flabbiness of the right thigh as compared with the left, and by digital pressure it was possible to demonstrate that the surface of the skin was raised further from the level of the deep aponeurosis on the right side than on the left. The fascia lata could be distinctly felt as a firm resistance on both sides, but the finger had to be pressed more deeply into the right thigh than into the left in order to reach this level, especially upon the outer surface of the limb. This condition gradually increased till a maximum difference in circumference was reached, and then gradually decreased until both sides measured the same at the end of the attack. The temperature was maintained at a high level, 104° to 105°, and the patient suffered from delirium and failing pulse for several days whilst this swelling lasted. Although the entire absence of any discoloration of the skin was against the diagnosis of hæmorrhage, yet it was thought that this was the most probable explanation, and that the absorption of the effused blood might cause the increased pyrexia.

The alternative diagnosis of abscess was unlikely owing to the absence of any œdema, heat or reddening of the surface, and to the resolution without operative treatment of such a large abscess. The condition cleared up in about a week with no other treatment than fomentations.

Very acute phlebitis was considered improbable owing to the absence of pain and œdema and to the very flabby condition of the thigh, which was due to a swelling caused by the (?) presence of fluid between the fascia lata and the skin. There was no pain on moving the hip joint, and nothing occurred during convalescence to point to any disease of this articulation.

(4) *Thrombosis* occurred in four cases of which two were admitted as convalescent from enteric fever, and two occurred amongst the thirty-six acute cases. Percentage is 6·45.

(5) *Bronchitis* occurred in eight cases in sufficient amount to require treatment, but did not prove a serious complication in a single instance.

(6) *Pneumonia* occurred in one case and proved fatal, but the patient also had large white kidneys.

(7) *Pleurisy* occurred on both sides of the chest in one case towards the end of the attack of enteric. There was at first acute pain and friction rub followed by slight double effusion which cleared up without tapping.

(8) *Appendicitis.* One case was admitted to the hospital as convalescent from enteric fever, and afterwards developed three attacks of acute appendicitis, in the last of which operation was advised but refused.

One case of *Jaundice* occurred after enteric.

(9) *Arthralgia* of shoulder joint (left side) occurred in one patient during the attack.

(10) *Deafness* was complained of by one patient but no otitis occurred, and it was thought that the deafness, which was more marked on one side than the other, might be due partly to cerumen.

No instance occurred of otitis, parotitis, periostitis, or peripheral neuritis.

Dysentery.

In the light of the recent investigations of Kruse* on epidemic dysentery in Germany, which seemed to show that the disease there was caused by a variety of the same species of bacillus which gave rise to the epidemics investigated by Shiga and Flexner, it is most interesting to note that the epidemic of dysentery amongst the troops in South Africa shows clinical evidences compatible with, if not suggestive of, a bacterial origin.

The following considerations indicate that the dysentery of South Africa resembles one of the specific infectious fevers, and is probably caused by the presence of some bacillus:—

1. It is infectious. Two patients at Elandsfontein developed the disease, whilst being treated in the hospital for other complaints in tents in which there were patients suffering from dysentery, and in each case the type of disease contracted resembled that from which the patients in the same tent had been suffering.

2. Incubation period. There seems to be a definite short period of incubation lasting four or five days.

3. The disease runs a definite course commencing with diarrhœa, which brings on griping pains and tenesmus, with passage of blood and mucus generally within thirty-six hours.

4. Its liability to relapses or to chronic conditions of alternating diarrhœa and constipation is well known, and is quite unlike the progress of a case of ordinary acute diarrhœa.

5. A still more important point showing its analogy with other specific fevers is that inflammatory conditions of the *joints may occur, especially during early* convalescence from an attack, just as they occur in scarlatinal or gonorrhœal rheumatism.

The pyrexia which occurs in most of the severe cases is invariably of an intermittent type, being high (103°–104°) in the evenings and normal or 99° in the mornings. This similarity in the temperature charts of dysentery patients

* *Vide Deut. Med. Woch.*, 1902, Nos. 23 and 24.

forms another link in the chain of evidence pointing to some specific origin of the disease.

The writer has noticed both a strange affinity and an antagonism clinically in some cases between dysentery and enteric fever, where the two diseases have occurred in the same patient. The affinity between the two diseases is shown by the fact that they may both be contracted at the same time, and that a patient recovering from the one seems particularly prone to be attacked by the other. The antagonism between the two diseases appears to be shown when a patient suffering from acute dysentery contracts enteric fever. A change may then take place in the progress of the dysentery, during the incubation period of the enteric, quite apart from the influence of any treatment, which results in the stoppage of the passage of blood and mucus, and in the development of a tendency to constipation rather than diarrhœa. At the same time the incubation period of the subsequent attack of enteric fever seems to be prolonged. During the course of the enteric fever diarrhœa may or may not occur, but it is extremely rare for any blood or mucus to be passed. Hence an attack of one disease seems to render a patient more liable to contract the other; and should the two diseases occur at the same time, the rivalry between them results in the defeat of the dysentery and the delay of the enteric.

There were forty-eight cases of dysentery, acute and chronic, admitted to the hospital at Elandsfontein, the largest number of admissions occurring during the months of October and November. The type of the disease was that of the catarrhal variety, met with at Deelfontein and Pretoria, in no instance was the amœba found to be present in the stools. Many of these cases were of an unusually severe character, which was due in some instances to the long time the disease had existed without treatment before admission. Two deaths occurred, which were caused in both instances by the presence of peritonitis following upon an unusually severe attack. Two patients suffering from gangrenous dysentery, passed foul-smelling greyish black sloughs of the intestinal mucous membrane, but made a good recovery. Five patients suffered from hiccoughs during their attack, two of whom succumbed as above mentioned from peritonitis, the three others recovered, two of whom suffered from vomiting in addition to hiccoughing for several days. As two cases out of five, in whom hiccoughs occurred, proved fatal, one must conclude that the occurrence of hiccoughs in a case of dysentery sounds a very grave note in the prognosis of the patient, and as a rule points to some involvement of the peritoneum in the inflammatory process either by perforation, or more often by a direct extension through the wall of the gut, already much weakened by deep ulceration and sloughing.

Complications were not numerous, no case of liver abscess following dysentery

occurred, but there were several cases of arthralgia in patients recovering from dysentery without any swelling of the joints or pyrexia. These joint pains usually occur during the first fortnight of convalescence, they are not very severe, and rarely give rise to any swelling of the joint or permanent trouble. In one instance (Trooper R.) the attack of dysentery was ushered in with premonitory pains in the joints, which were again attacked with pains during convalescence. The knees, shoulders, and elbows, seem to be the more favourite sites of this form of arthralgia.

The treatment of dysentery by the administration of sulphur, first commenced seven months previously at Deelfontein, was continued with satisfactory results at Elandsfontein. Every case under the writer's care was treated in this way, and in all twenty-one cases of acute and eleven cases of chronic dysentery were treated with sulphur. With the exception of two cases which proved fatal, the cases recovered. Although sulphur is not an infallible cure for every case of dysentery the writer has never seen a patient die, who had been treated with sulphur, unless peritonitis supervened. The special recommendations of sulphur are that it quickly relieves the pain and diarrhœa, and the cure seems more lasting and there is little tendency to relapse or to chronic conditions. In this connection it is interesting to record that the charts of patients treated with sulphur frequently show a period of subnormal temperature, lasting for eight or nine days during convalescence, which suggests that the disease is really finished with, and recalls the subnormal temperature met with after an attack of enteric fever. This shows a strong contrast with the chart of a patient suffering from chronic dysentery, in which an evening temperature of 99° to 100° may frequently occur, although the morning temperature may be subnormal.

Sulphur combined with Dover's powder or opium was administered to the acute cases, and sulphur alone was given to the chronic cases, and to some of the acute cases, in which the pain and diarrhœa were less severe than usual.

Below three cases are quoted which were treated with sulphur. Acute dysentery (two cases); chronic dysentery (one case):—

Case 1. *Acute Dysentery, Hiccough, Sloughs. Recovery.*—Trooper A. G., aged 23, admitted November 26th, with acute dysentery of three weeks' duration, having passed eighteen or twenty motions in the twenty-four hours for the past fortnight, consisting entirely of blood and mucus. There was extreme tenderness over the sigmoid flexure. He was ordered sulphur and opium powders, four-hourly; in twenty-four hours the tenderness was much relieved, and the patient stated that he was more comfortable than he had been for the past two weeks. After forty-eight hours' treatment, only traces of blood and mucus were passed with the motions, which had become almost entirely fæcal in character. The attack was a very severe one, as the patient suffered from hiccough for ten days, and passed foul-smelling black-grey sloughs of the mucous

membrane of the intestine for two days. Rectal injections of lysol were also given in this instance. The patient made a good recovery in two weeks. It is possible that in this case there may have been some local peritonitis, due to direct extension through the intestinal wall.

Case 2. *Acute Dysentery. Death. Post-mortem.*—Trooper G. M., aged 29, admitted October 21st, having suffered from acute dysentery for three weeks, and having passed thirty motions daily for the last fortnight, consisting almost entirely of blood and mucus. He had suffered most acutely from griping pains and tenderness over the whole abdomen, but especially over the transverse colon, sigmoid, and cæcum. Large quantities of blood and mucus continued to be passed for a week, but after that date the blood and mucus began to cease, and the motions became more fæcal in character and fewer in number. But about this time vomiting commenced and increased in frequency, and the abdomen showed more definite signs of rigidity, and did not move well with respiration. The pulse also became feeble and running, and increased to 120 per minute. The patient became more and more feeble, and died on October 31st. Sulphur and Dover's powders were given, four hourly, and the amount of opium was largely increased, owing to the persistence of severe griping pains and abdominal tenderness. A saline infusion was given, but only delayed a fatal termination for a couple of hours.

At the post-mortem examination there was general peritonitis, with dirty brown fluid in the general peritoneal cavity. There were adhesions, chiefly round the transverse colon, which was adherent to the stomach, spleen, omentum, and to two coils of the small intestine. There were also some adhesions in the neighbourhood of the sigmoid flexure, cæcum, and appendix. The whole of the large intestine was greatly thickened, and closely studded with sloughing ulcers, varying from the size of a shilling to patches two inches by three inches in area. Some of the ulcers from which the sloughs had separated presented a healing surface, smooth and pink, without blackening of the peritoneal surface. In no place was there a definite perforation, but the peritoneum was frequently covered with a thick layer of lymph over the sloughing ulcers, and in other places the peritoneal surface was blackened. The rectum was thickened and ulcerated, but less ulcerated than other parts of the large intestine. The sigmoid flexure and descending colon contained several deep sloughing ulcers, covered with black-grey sloughs, and with lymph on the corresponding peritoneal surface; the transverse colon and splenic flexure were most thickly studded with these sloughing ulcers, and the walls of the gut were here soft and fragile, and adherent to neighbouring structures. The ascending colon contained several ulcers with adherent sloughs, and one large healing ulcer, smooth and pink, three inches by two inches. In all cases where the ulcers were not covered with sloughs, they showed signs of healing. The appendix was thickened and ulcerated, and distended with thick white mucoid material. There were also sloughing ulcers in the lower part of the ileum, where it was adherent to the transverse colon, with also one or two smaller healing ulcers.

Case 3.—Surg.-Capt. C., aged 31, admitted October 9th, with chronic dysentery of more than four months' standing. He had had three acute exacerbations of dysentery during this time. In spite of varying kinds of treatment he was still passing some mucus, and had suffered from diarrhœa for the whole of the four months, and was now passing four liquid motions daily. There were tenesmus, griping pains, and tenderness over the sigmoid and cæcum. He was kept in bed for a week, carefully dieted, and given sulphur, 20 grs., three times a day. Five days after admission his motions were formed, and his bowels were only moved once in twenty-four hours. He only passed mucus for two days after admission. He made an uninterrupted recovery, and gained three pounds in weight in the first week. On being given chicken, he showed no tendency to relapse. This patient was again heard of in July, 1902, and was then quite well and

strong; although he was again living in South Africa he had shown no tendency to any relapse since he had left the hospital at Elandsfontein.

(3) *Diseases of the Liver.*—Five cases of catarrhal jaundice were treated in hospital. In one instance jaundice followed an attack of enteric fever. One case of alcoholic cirrhosis of the liver, and two cases of enlargement of the liver of uncertain origin were admitted. One case of acute suppurative cholecystitis occurred in a patient recovering from enteric fever who was found at the operation to have gall-stones. (*Vide* p. 257.)

(4) *Tonsillitis.*—Thirty-nine cases of tonsillitis were admitted. Some of them occurred in rheumatic subjects, who afterwards developed joint pains.

(5) *Diarrhœa.*—Twenty-four cases of diarrhœa were treated in hospital, which in some instances was found to be due to the consumption of tinned meats.

(6) *Appendicitis.*—Three cases of appendicitis were admitted; two were recurrent cases, one of whom had one slight attack whilst in hospital, and the other had three very severe attacks with localised peritonitis, high fever (105° F.), but he persistently refused all offers of operative interference. He was ultimately sent home by his own wish during an afebrile period, but was unable to travel as far as Durban, being detained at Mooi River Hospital en route.

(7) *Dyspepsia.*—Nineteen cases of gastritis and dyspepsia were admitted. In the majority of cases the dyspepsia arose from the presence of bad teeth and from unsuitable food.

(*b*) Diseases of the Circulatory System.

(1) *Valvular Disease of the Heart.*—Ten cases of valvular disease of the heart were admitted and recommended for England; none proved fatal. The mitral valve was affected in eight cases, of which three were mitral stenosis. A case of mitral stenosis with secondary dilatation of conus arteriosus was admitted, with physical signs which might have suggested aneurysm.

Trooper K., admitted October 23rd, with a diagnosis of 'Disordered action of the heart.' He had had rheumatic fever when a boy aged seven years, and had suffered for two or three years with pain in the chest and was subject to occasional faintness. He was discharged from the service of the L. & N.W. Railway Co. for heart disease. He was told on enlistment that his heart was weak, and had some difficulty in passing!! On admission, the apex beat was in the fifth space, ½ inch internal to nipple line; there was also a well-marked impulse in the fourth, third, and second spaces. A thrill could be felt at the apex presystolic in rhythm. The cardiac dulness extended downwards from third rib, and towards the right to the right border of the sternum. No bruit was audible at the apex on admission, but in the second and third spaces to the left of the sternum a loud, rumbling, systolic bruit could be heard. It was loudest in the third left space close to the sternum, was also audible in the second left space, but not to the right of the sternum nor over the manubrium sterni. It could not be traced far in any direction,

and was not audible behind. There was pulsation to the right of the sternum occasionally, and about a week after admission a presystolic bruit was distinctly heard at the apex in addition to the systolic bruit mentioned above. This case was thought to be one of mitral stenosis, with probably dilatation of pulmonary artery leading to a virtual stenosis of pulmonary orifice.

(2) *Service Heart* (*Disordered Action of the Heart*).—The hearts of some weakly patients are quite unable to withstand the strain and anxiety of active service; the long hours in the saddle or long marches on foot, the mental excitement of being under fire, exposure to bad weather, irregular meals and bad food, all tell upon their general health, and their hearts become unequal to their task and give way under the strain. These patients were frequently men of poor physique, thin and badly nourished, with small flabby muscles. One patient stated that on one march the only food obtainable was a small quantity of flour and water, which was served out to each man to do what he liked with; many of them simply drank the flour mixed with cold water, being unable to cook it. The symptoms generally complained of were pain in the chest in the region of the heart, faintness, palpitation, and breathlessness on exertion. The physical signs are very variable. The pulse was generally feeble, irregular in force and rhythm, and of small volume. As a rule there are no bruits, but in some cases bruits were present at one examination and absent when listened for again. In these cases the great feature of the bruits was their variability both in time and character. There was often evidence from increase in the cardiac dulness and position of the apex of general dilatation of the cardiac cavities. As the health of the patient improved the symptoms tended to diminish, but recovery was generally too slow to allow of the patient returning to the front, and most of these patients returned to either light garrison duty or were invalided home.

(3) *Anæmia.*—A profound condition of secondary anæmia often followed attacks of malaria, rheumatism, enteric, and long attacks of dysentery with repeated loss of blood, and Bright's disease.

(*c*) Respiratory System.

The diseases under this class form a comparatively unimportant section, both as regards the number and severity of the cases admitted. This was due no doubt to the fact that the hospital was open only during the summer months.

Pneumonia occurred as a fatal complication in one case of enteric. No other case occurred in the hospital.

Ten cases of bronchitis were admitted. Many of the attacks occurred in patients who suffered from emphysema. One case of emphysema suffered from dyspnœa, which was aggravated by the rarefied air of the Transvaal, as

shown by the fact that he was subsequently observed to be comfortable on the sea level.

Three cases of pleurisy were admitted, one case resulting from fractured ribs. Double pleurisy with effusion occurred in a case of enteric, and double pleurisy with effusion on the left side occurred as a complication in a case of phthisis. This latter case required tapping, and twenty-four ounces of clear serous fluid were withdrawn, to the great relief of the patient, whose respirations had risen to fifty per minute.

Three cases of tuberculosis of the lung were admitted and one case of asthma.

(*d*) Nervous System.

Under this head the chief admissions were five cases of epilepsy, a few of sunstroke, and one of delusional insanity. All these patients were invalided to England. A patient who has once suffered from the effects of exposure to the sun's rays, seems to have a very remote chance of recovery whilst he remains exposed to the climatic influences of South Africa: *e.g.*:—

Capt. C., aged 31, stated that some weeks previously he had been taken suddenly ill after a long day's march in the hot sun, at a time when he was working at high pressure, and acting as adjutant to the column in addition to his usual duties. He at first suffered from severe headache and feverishness, but did not suffer from rigors nor sweating. For several days he stated he suffered from an intermittent temperature, low in the mornings and raised in the evenings. It was thought that this condition might be malarial, and before admission he had been treated with quinine. On admission he complained of severe occipital headache, worse in the daytime, and whenever he went out into the sun or after a particularly bright day. There was also some loss of memory, with great depression. There was obstinate constipation, with foul tongue and sallow complexion. His appetite was bad, and he could scarcely be persuaded to take any food. The spleen was not enlarged. There was no optic neuritis, and the reflexes and sensation were normal. He was treated with purgatives, and given a course of bromides and iodides without any improvement taking place, and finally invalided home.

The sciatic nerve was the only instance of neuritis met with apart from surgical cases. In some instances the disease occurred in a patient suffering from rheumatism.

One case of delusional insanity was admitted. The patient stated that he had suffered from fits as a child, and his brother stated that he had been 'queer in his mind' once before when at home in Scotland. His father had been a man of intemperate habits. He had delusions of persecution, fancying that he heard voices reviling him. He was strange and vacant in his manner but not violent or dangerous. Under a generous diet and exercise his mental condition improved, but towards the close of the Yeomanry Hospital he developed fever with enlargement of the spleen, and was transferred to another hospital.

(*e*) Excretory System.

One case of floating kidney was admitted, and invalided to England for further treatment. One case of uræmia occurred in a patient suffering from acute nephritis. The day after admission there was partial suppression of urine, which was highly albuminous, and that evening the patient became unconscious and suffered from uræmic convulsions. He remained unconscious for three days, but finally recovered.

The number of admissions for nephritis in this hospital was small (three cases), and there have been surprisingly few admissions throughout the campaign, when we come to consider the number of times the men have been compelled to sleep with very scant protection against the heavy rains and extreme cold of an African night.

In one case of granular kidney a small cerebral hæmorrhage occurred, which resulted in slight left facial paralysis and slight paralysis of left side. When the hæmorrhage first occurred, there were convulsive twitchings of muscles of left arm and hand. The patient finally recovered, with some permanent weakening of left arm and leg. This patient also suffered from a curious condition of the skin of his hands. Vesicles formed beneath the deeper layers of the horny stratum over the whole of the palmar and dorsal surfaces of the hands, the fingers being specially involved. These vesicles never wept, and remained *in statu quo* for six weeks, when the hands peeled in broad, thick flakes, leaving the hands covered with a fine new pink epidermis. The feet and toes were also attacked in a similar way, no other part of the body being affected. The patient had a similar attack on the voyage home, and for a few days before the vesicles formed he complained of a feeling of general malaise; there was slight itching of the hands at first. The condition did not extend above the wrists or ankles. Burrows of the itch mite were searched for without result, and the disease was thought not to be eczema owing to the absence of any weeping, and the great depth of the vesicles and the thickness of their walls.

(*f*) Special Senses.

One case of rheumatic iritis and one case of syphilitic iritis were treated in hospital. One curious case of deafness and noises in ear was caused by the presence in the external meatus of a live sheep tick, which had fastened its head into the upper wall of the meatus near the tympanic membrane. Removal of the insect gave relief to a condition which had lasted some weeks.

(*h*) Diseases of the Joints.

Six cases of acute rheumatism were treated in hospital. One case had four relapses, and was under treatment three months. No case developed heart disease after admission. Thirty-eight cases of subacute rheumatism and pains in the back and joints were admitted. In some instances it was very difficult to decide, in the absence of physical signs, whether the patient were malingering or not. A few cases of arthralgia occurred in connection with attacks of dysentery, and one during an attack of enteric fever.

(*i*) Other Medical Diseases.

There were twenty-seven cases of malaria admitted to the hospital. In a few cases the charts showed an intermittent temperature, rising to 104° F. during the attack and falling to normal the next morning. In very few cases was the cold stage with rigor and subsequent hot stage and sweating well marked. In the majority of cases the temperature was of a remittent type, seldom falling in the morning more than a degree or a degree and a half; scarcely any rigor or sweating was complained of, the spleen was often not palpable, and it was in these cases that the difficulty of diagnosis from enteric, rheumatism, and influenza was most pronounced, and in some cases impossible without the aid of quinine and the microscope. In this remittent kind of malaria, this drug did not seem to act with the same potency and speed as in the more typical intermittent cases, for the temperature would often remain up for five or six days during the administration of quinine, only gradually falling to normal. Some of the cases of enteric in the earlier stages closely resembled this type of malaria owing to the remittent character of the charts. One or two cases suffered from malaria and enteric, and in one instance the malaria recurred after the attack of enteric had finished. One case of bilharzia hæmatobia was admitted. The embryo was found in the urine as an actively moving ciliated organism. None of the eggs were discovered.

Simple Continued Fever.—Thirty-one cases of simple continued fever were admitted to hospital. As a rule this was a provisional hasty diagnosis made before sending the patient to the hospital; and it became easy, on watching the case carefully, to classify it as enteric, malaria, rheumatism, or influenza. But a few cases remained indefinite, and were allowed to remain under this heading for lack of a better one.

SURGICAL REPORT.

By HOWELL D. DAVIES, M.B.

Surgeon to the Hospital.

The Hospital was open from July 15th, 1901, to December 31st, 1901. In all there were 205 surgical cases, of which exactly one-quarter, 51, were gunshot wounds. A tabulated statement of the cases, and of the operations performed, is appended.

I.—Gunshot Wounds Treated at the Imperial Yeomanry Hospital, Elandsfontein.

I. *Gunshot Wounds of the Head* (2).
1. Perforating the cranium with fracture and depression; temporary aphasia and hemiplegia 1
2. Perforating the cranium with lesion of branches of right carotid artery, ligature of common carotid ... 1

II. *Gunshot Wounds of the Face* (3).
1. With flesh wound of nose 1
2. With fracture of upper jaw .. 1
3. With fracture of lower jaw... ... 1

III. *Gunshot Wounds of the Neck* (2).
Two passing through the neck without apparent injury of any structures... 2

IV. *Gunshot Wounds of the Chest* (5).
Bullet passing through the chest without evidence of lesion of any of the contents. Pleurisy occurred in two cases 5

V. *Gunshot Wounds of the Abdomen* (1).
Perforating the abdomen from before backwards in right umbilical region; passed some blood per rectum for four days, healed without complication 1

VI. *Gunshot Wounds of Back and Spine* (2).
1. With fracture of the sacrum, paralysis of rectum and bladder, paresis right leg, bullet lodging in pelvis... 1
2. With fracture of the sacrum, but no complications 1

VII. *Gunshot Contusions and Wounds of Perineum and Urogenital Organs* (2).
1. Passing through left thigh, perineum, and right hip 1
2. Passing through scrotum and testicle 1

VIII. *Gunshot Wounds of the Upper Extremities* (19).
1. With compound fracture of radius and ulna 1
2. With compound fracture of ulna ... 1
3. „ „ „ metacarpals 1
4. With lesion of nerves 4
5. Lesion of artery 1
6. Implicating large joints 2
7. Without lesion of bones, nerves or arteries 9

IX. *Gunshot Wounds of Lower Extremities* (26).
1. With compound fracture of femur 4
2. „ „ „ tibia ... 1
3. „ „ „ tibia and fibula 1
4. „ „ „ tarsus... 1
5. Implication of knee joint 1
6. With lesion of nerves 1
7. „ „ femoral artery ... 1
8. Without lesion of bones, nerves, or arteries 16

X. *Gunshot Wounds with direct injury of the large Arteries,* not being at same time cases of complicated fracture (3).

1. Brachial 1
2. Superficial femoral 1
3. Carotid 1

XI. *Gunshot Wounds with direct penetration or perforation of larger Joints* (3).

1. Perforating shoulder 1
2. „ elbow 1
3. „ knee 1

XII. *Gunshot Wounds with direct injury of the large Nerves,* not being at same time cases of compound fracture (5).

1. Ulna nerve 2
2. Median nerve 1
3. Median and musculo-spiral nerves together 1
4. Anterior crural 1

Total number of Gunshot Wounds... 73

In many instances patients had multiple wounds so that these 73 gunshot wounds occurred in 51 patients.

II.—Surgical Cases other than Gunshot Wounds.

Nature of Disease or Injury.	Number of Cases.
1. Contusion of different regions	13
2. Fracture of long bones (not result of Gunshot Wounds)	8
3. Concussion of Brain, 4; of Spine, 1	5
4. Dental caries, serious cases of	21
5. Deafness, mostly perforation of one or both membranæ tympani	18
6. Hæmorrhoids	6
7. Varicocele	5
8. Veldt sores	5
9. Inflammation of the middle ear	3
10. Hernia—inguinal	6
11. Flat foot	3
12. Varicose veins	2
13. Miscellaneous surgical cases...	59
Total ...	154

1. Cases of Gunshot Wounds	51
2. Surgical cases other than Gunshot Wounds	154
Total number of Surgical cases ...	205

III.—Venereal Cases.

1. Syphilis (*a*) Primary	1
(*b*) Secondary	13
2. Gonorrhœa	7
Total number of Venereal cases ...	21

Return of Operations at I. Y. Hospital, Elandsfontein.—Major Operations.

Corps	No.	Name and Rank.	Nature and cause of disease or injury which necessitated the operation; date of onset or receipt of injury.	Nature and anatomical site of operation, and anæsthetic used.	Name of operator & date of operation.	Progress of case, noticing any sceondary complications.	Discharged to duty, invalided, transferred or died, with date.	Remarks.
8th Batt. I. Y.		Major McP., D. H. ...	Hæmorrhoids with prolapse, sloughing of piles.	Whitehead's excision of pile-bearing area of rectum — chloroform and ether.	Mr. Davies, Oct. 5, 1901.	Uninterrupted recovery.	Duty ...	The prolapse and sloughing of the piles rendered the operation urgent.
63rd Co. I. Y.		Trooper Churchman, T.	Varicose veins ...	Excision of varices—ether.	Mr. Davies, Oct. 26, 1901.	Cured ...	Invalided.	
103rd Co. I. Y.		Trooper Smith, A. ...	G. S. W. of pelvis, comp. fracture of sacrum, &c. Injury received 26th June, 1901.	Extraction of bullet—chloroform and ether.	Mr. Davies, Nov. 14, 1901.	Very satisfactory improvement.	Invalided	The bullet was received in action five months previously (June 26th). It entered just over the post. sup. spine of the ilium on the left side, passed obliquely to the right and downwards through the sacrum, and became lodged in the pelvis. There was very profuse discharge of pus from the sinus. There were paresis of right leg, and paralysis of bladder and rectum. The bullet was located 2¾ in. below the surface of sacrum by Mackenzie Davidson's apparatus. It was removed through the right sciatic notch, the gluteal artery having to be ligatured. It was a ricochet Mauser bullet, being doubled on itself into a V-shape. (*See* photo.)
I. Y. Depot ...		Sergt. Gorst, W. ...	Varicose veins ...	Excision of varices—chloroform.	Mr. Davies, Nov. 23, 1901	Cured ..	Duty.	
27th Co. I. Y.		Trooper Priscoe, W. H.	G. S. W. lower jaw, comp. comminuted fracture of jaw.	Removal of necrosed fragments & drainage—chloroform.	Mr. Mullins, Nov. 7, 1901.	Healed ...	Invalided.	
I. Y.		Trooper Chislett ...	Empyema of gall-bladder.	Cholecystotomy—chloroform and ether.	Mr. Mullins, Nov. 12, 1901.	Uninterrupted recovery.	Invalided	The patient was admitted for enteric fever, and had a very severe attack with two hæmorrhages. Temp. became normal, but again oscillated for a week between 98° and 102°. On Nov. 12th temp. rose to 105° and pulse to 120°. Patient had pain, tenderness, and rigidity on the right side of abdomen below the liver, quite localised. The symptoms seemed to point to localised peritonitis with collection of pus, so an incision was made, and the peritoneal cavity opened. There was no localised peritonitis, but the gall-bladder was found to be greatly distended, and reaching almost to level of umbilicus. It was stitched to the edges of the parietal wound, and then opened. 8 gall-stones and about 8 ounces of pus were withdrawn. Some pus escaped into peritoneal cavity and was washed out. Bile continued to be discharged through the fistula until he was discharged.
103rd Co. I.Y.		Trooper Cashmore, S. ...	G. S. W. right hand.	Extraction of pieces of splintered bullet—chloroform.	Mr. Davies, Nov. 24, 1901.	Healed and cured.	Invalided	Also G. S. W. in right shoulder. The fragments of bullet were only discovered with X-ray apparatus. They had entered over the thenar eminence, and were lodged in various parts of the hand. Besides the 5 pieces removed numerous small fragments are shown in the X-ray photograph (*see* next page).

FRAGMENTS OF BULLET IN THE HAND (IN CASE DESCRIBED IN TABULATED STATEMENT).

RETURN OF OPERATIONS AT I. Y. HOSPITAL, ELANDSFONTEIN.—MINOR OPERATIONS.

Nature of disease or injury which necessitated operation.	Nature of operation	No. of Cases.
Dental caries requiring chloroform	Extraction of teeth	7
Improving toe-nail	Evulsion	2
Fistula in ano	Opening and scraping ...	2
Miscellaneous	... ...	4
	Total ...	15
	Total Major operations ...	7
	Total ...	22

LEE-METFORD BULLET. RICOCHET BULLET. MAUSER BULLET.

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STRANGEWAYS & SONS, PRINTERS,
TOWER STREET, CAMBRIDGE CIRCUS, LONDON, W.C.